

Report Launch:

ASGM TAILINGS MANAGEMENT AND REPROCESSING GOVERNANCE: GLOBAL TRENDS

IGF Secretariat
MAY 2024



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PROJECT BACKGROUND

By Clémence Naré



Project:

DEVELOPING POLICIES TO REDUCE MERCURY POLLUTION FROM THE ASGM SECTOR



INTERGOVERNMENTAL FORUM
on Mining, Minerals, Metals and
Sustainable Development

ASGM Tailings Management and Reprocessing Governance:

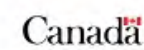
Global trends



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Project Timeline

Project initiation & Phase 1 – October 2022 – May 2024

- Global Research and Assessment on ASGM Tailings governance.
- Knowledge tools and best practices on ASGM and tailings management.

Phase 2 – June 2023 – September 2025-2026

- Capacity Building, including regional trainings in Africa, Asia and Latin America
- Deep-Dive Support in 3 countries

Phase 3 – March – September 2025-2026

- Case studies & lessons learned.
- Policy Guidance and Dissemination.

Project overall objective : The project aims to support resource-rich producing countries to design and implement appropriate regulations for the sound management and responsible exploitation of ASGM tailings including the management of mercury



Project Status

COMPLETE

PHASE 1:

- Global Assessment of ASGM governance

IN-PROGRESS

PHASE 2:

- Confirmation of Deep-Dive Countries

UPCOMING

PHASE 3:

- Recruitment of consultants
- Partnerships and collaborations for implementation



WHAT DOES THE REPORT COVER?

By Gregoire Bellois

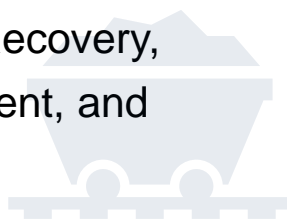


What Will You Find in This Report?

PART A

Technical Considerations

- ASGM Ore Extraction and Processing
- ASGM Tailings Generation, Handling, Management, and Reprocessing
- Mercury Recovery, Management, and Disposal



PART B

Existing ASGM Tailings Governance Frameworks

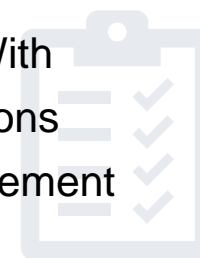
- International Governance Frameworks
- Regional governance frameworks
- National Frameworks



PART C

Policy Considerations

- Formalization and Sound Management of Tailings
- Taxation of Transactions Related to ASGM Tailings
- ASGM Interface With LSM and Implications for Tailings Management and Reprocessing



Recommendations

Case studies

Australia
Brazil
Colombia
Ghana
South Africa
Tanzania
Women and tailings management

Methodology



Members consultations on project scoping

Scoping report

Internal focus group

Government survey

Interview with experts

Literature review

Draft report

Internal review

External peer review

Member consultations on findings

External peer review

Final report



BACKGROUND AND CONTEXT



Artisanal and Small-Scale Gold Mining (ASGM)

Most miners in the world are ASM

20+ million ASGM, in 80+ countries

20% of the world gold supply

Artisanal / Small-scale

High degree of informality



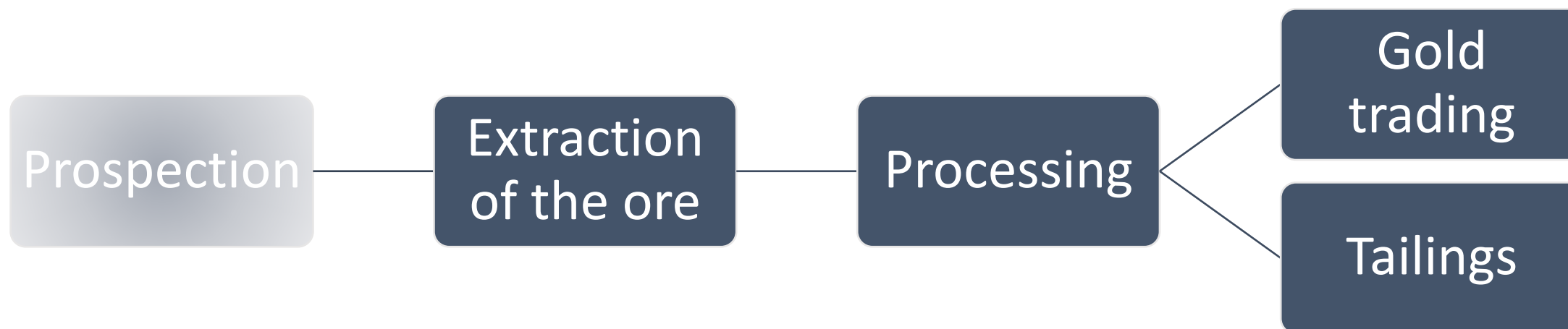


ASGM Operations

Limited prospection

Diverse methods of ore extraction (including alluvial, hard rock mining, and scavenging), and processing (including gravity, cyanidation, amalgamation) and results in:

- Gold that can be sold
- A variety of wastes and residues that determine tailings' composition and characteristics.





ASGM Tailings

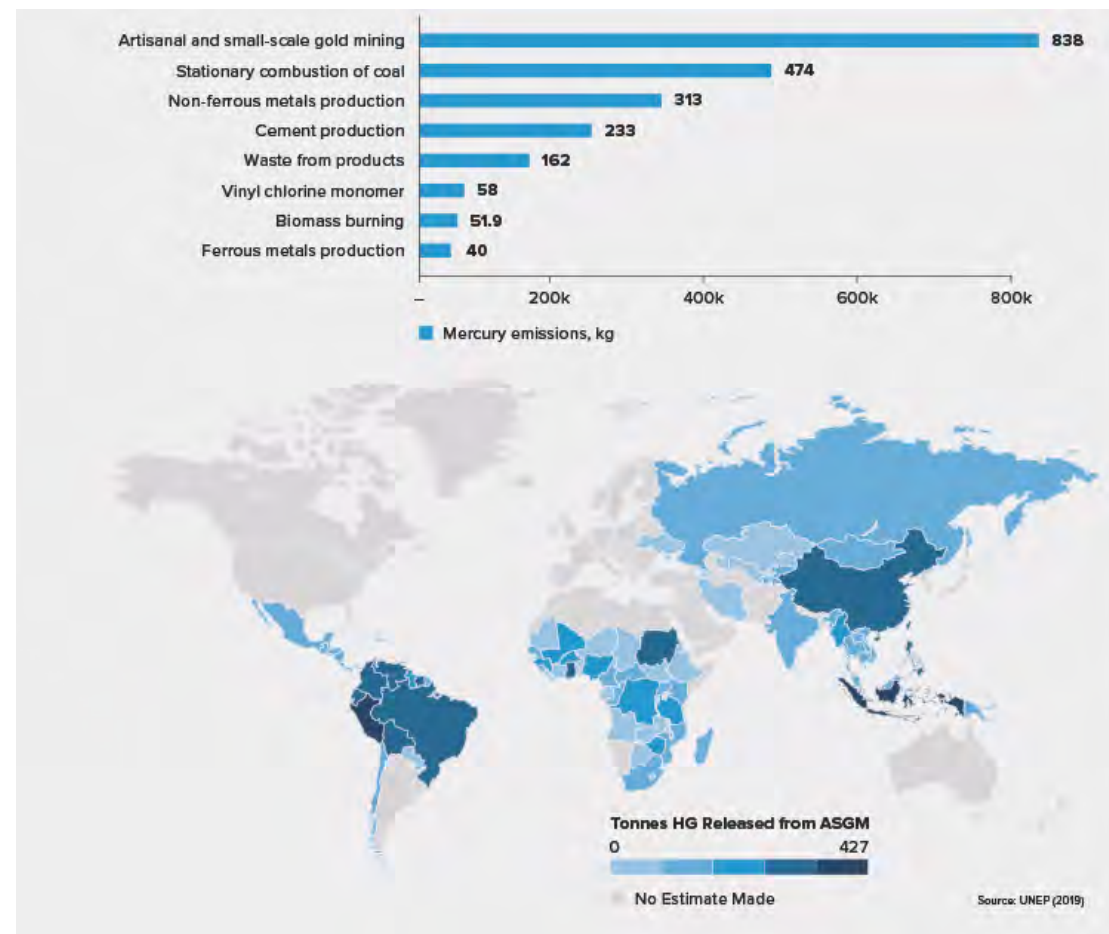
- Waste from ore processing (Comminution and separation)
- Consist of the original material extracted
 - Including residual gold non recovered,
 - Plus, what has been added during the process (water, mercury...),
 - Minus the gold extracted.
- Low recovery rate. Estimates are around 30% of gold is usually extracted from initial recovery → potential for reprocessing
- Issues of physical and chemical stability. Residual long-term contamination of environment





Mercury Use in ASGM

- Capacity to create amalgam with gold → used at the separation stage
- Widely used by ASGM because:
 - Easy to access
 - Relatively cheap
 - Easy to use
 - Fast process
 - Full control over the process
- Mercury dissemination through vapor when burning the amalgam and in river streams and soil.
- Bioaccumulation: affect the whole food chain (fish...)
- Highly neurotoxic. Impact on children and pregnant women.
- Controlled under the Minamata convention
- ASGM is the largest emitter of mercury in the atmosphere





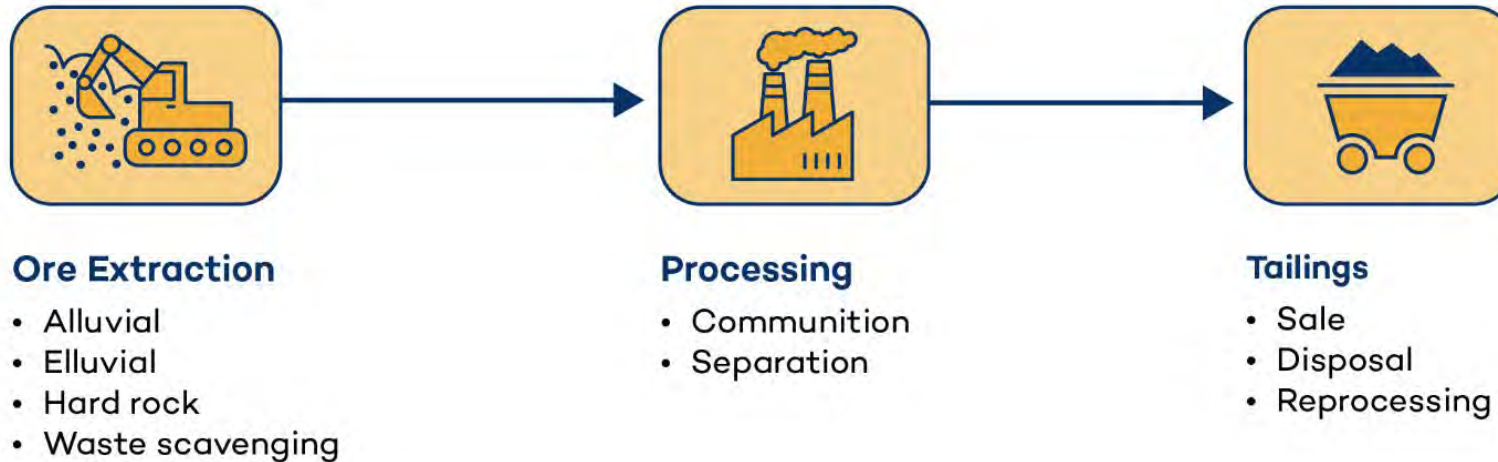
FINDINGS AND RECOMMENDATIONS



TECHNICAL CONSIDERATIONS

By Giorgio de Tomi

ASGM Tailings: Why and how?



The “separation” stage is key for Tailings Generation

- Gravity separation
- Magnetic separation
- Flotation
- Mercury amalgamation & vaporizing



Most Employed Alternatives to Amalgamation



Chemical Leaching

- When done properly, it provides better economic and environmental results
- However, cyanide is a toxic chemical component, hence the use of cyanide by ASGM operators has the potential to create adverse, even dangerous, impacts

Direct Smelting

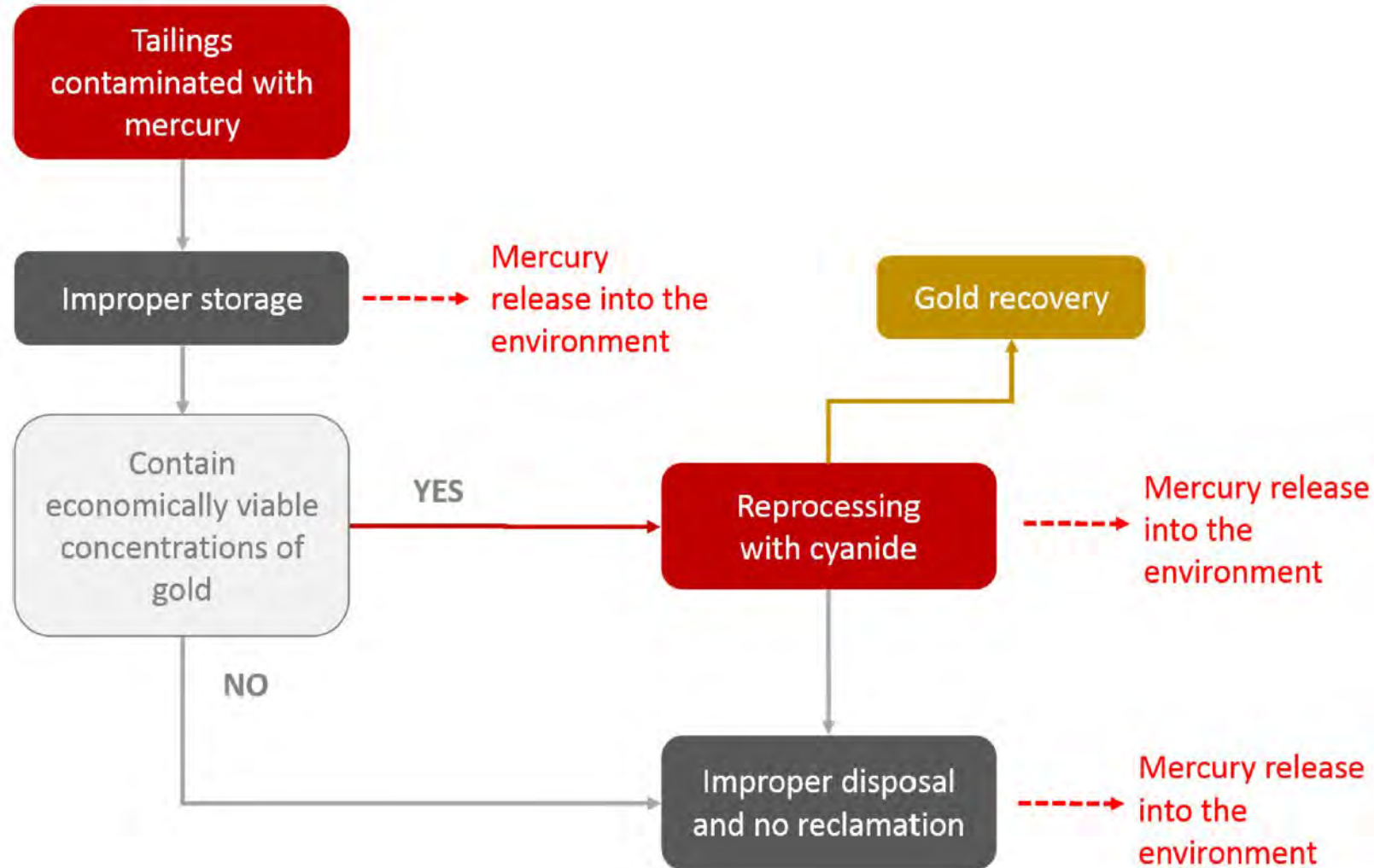
- Direct smelting is usually employed in the final phase of gold recovery.
- It can be a substitute for leaching and separation for some specific types of ore



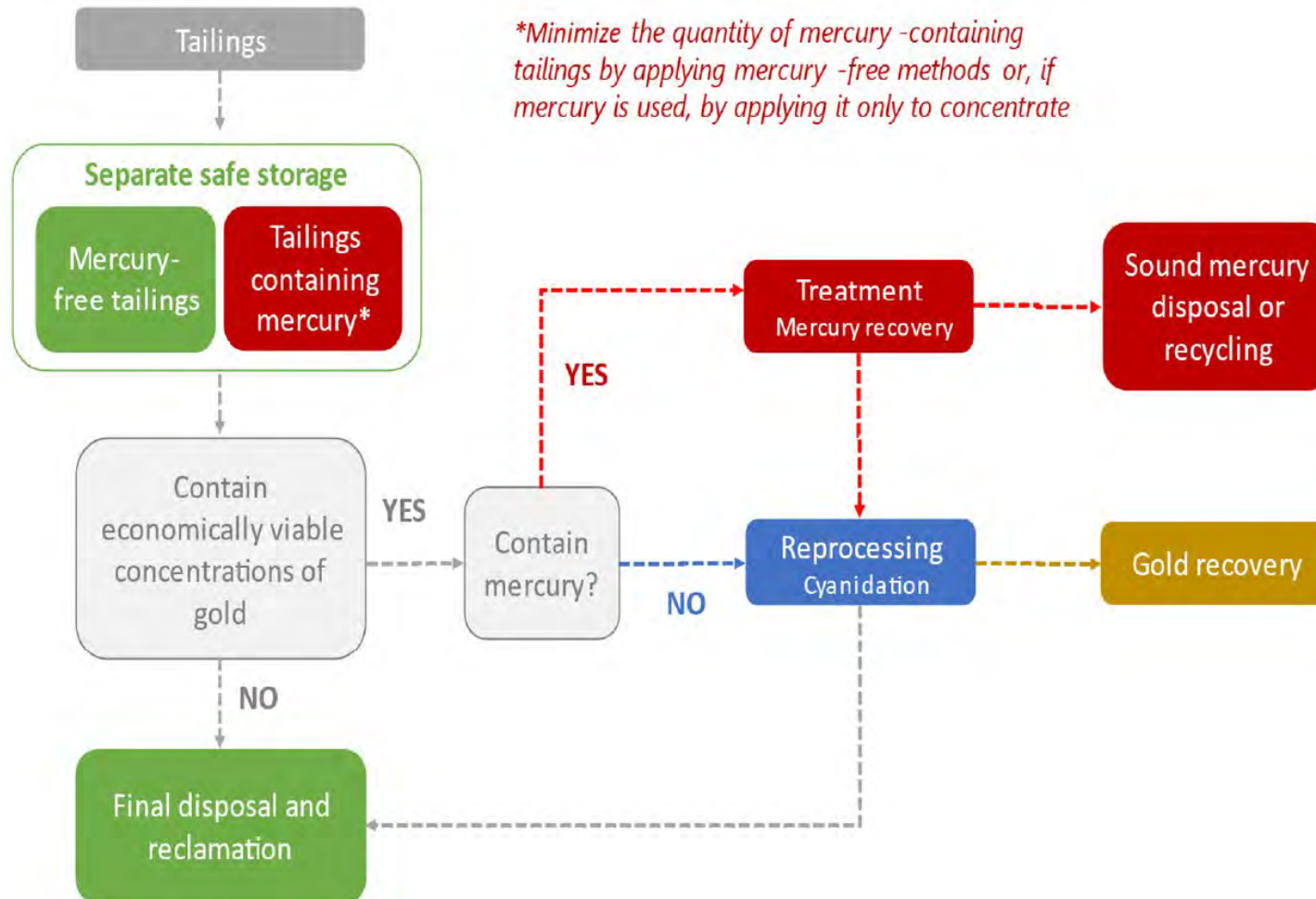
IMPORTANT: Although chemical leaching can deliver good results, the use of cyanidation on materials already contaminated by mercury enhances the mobility of the mercury through the creation of mercury-cyanide complexes and is considered a “worst practice” by the Minamata Convention



ASGM Tailings Management: Challenges with the current practices



ASGM Tailings Management: Proper methods to minimize impacts





POLICY CONSIDERATIONS

By Nellie Mutemeri

International Governance Frameworks

- The focus on ASGM tailings management has been relatively limited within existing governance frameworks
- International protocols regulating ASGM tailings are scarce, despite their significant environmental and health risks
- Notable international guidance documents include:
 - UNEP's "Sound Tailings Management in Artisanal and Small-Scale Gold Mining"
 - PlanetGOLD's "Best Management Practices for Cyanide Use in the Small-Scale Gold Mining Sector"
 - National action plans under the Minamata Convention address ASGM tailings management, with 33 countries finalizing plans and 45 in development



National Legislation

- Mercury use is prohibited in most assessed countries, except Nigeria, Tanzania, Ghana, Peru, and Honduras.
- Cyanide use is prohibited in approximately half of the assessed countries.
- Mining codes include regulations on tailings management, but specific provisions for ASM are lacking.
- Ghana, Tanzania, Colombia, and Chile have legislation explicitly for ASM permit holders, while others have ambiguous regulations.
- Most countries require environmental impact assessments (EIAs) or environmental and social impact assessments (ESIAs) for mining applications, often excluding artisanal permits.
- Some countries establish state-financed rehabilitation funds for mine site restoration.
- Nigeria and Cameroon enforce fines for environmental violations.
- Several countries have legislation for (re)processing mine tailings, including permitting systems.
- Despite existing legislation, effectiveness is hindered by the informal nature of the sector and weak enforcement mechanisms.



ASGM Interface with LSM and Implications for Tailings Management and Reprocessing

- ASGM and LSM often coexist in the same areas, leading to varied interactions.
- Formal ASGM outside LSM concessions typically manage their own tailings, adopting best practices from LSMs.
- Successful coexistence models, like the Community Mining Scheme in Ghana, demonstrate effective tailings management.
- Formal ASGM within LSM concessions requires coordination and agreements for enhanced tailings management.
- Informal ASGM poses challenges for LSM operators, necessitating recognition and formalization for sustainable development.
- ASGM activities linked to criminality demand focused risk mitigation and law enforcement efforts.
- Gender dynamics influence tailings management, requiring prioritization of women's participation and empowerment.
- Collaborative efforts, regulatory frameworks, and gender-inclusive approaches are vital for sustainable mining practices.



Taxation

By Viola Tarus

Most countries differentiate fiscal regimes for large-scale, medium-scale and artisanal mining

E.g., in Zimbabwe, the ASM sector pays 1% royalty rate on gold revenues, while LSM operators are charged between 3% and 5%





RECOMMENDATIONS



Recommendations to Governments

- Develop a tax framework for ASGM tailings
- Grant tax and/or non- tax incentives to actors that reprocess tailings to extract residual gold.
- Ensure all players that profit from tailings processing are taxed. These include landowners, processing plants etc.
- Establish a robust transfer pricing system for the sale of tailings
- Increase oversight to monitor by-products extracted from processing the tailings



Recommendations

Tailings Management

Minimize mercury-containing tailings & use low cyanide concentrations.

Educate on mercury-free alternatives & safe cyanide use.

Track chemical distribution for transparency & risk mitigation.

Educate on mercury-free techniques & equipment.

Promote safe cyanide use & access to mercury-free tech.

Train in safe cyanide use & implement spill safeguards.

Involve miners in formalization & enhance community awareness.

Educate on impacts & promote regional tailings dumps.

Encourage separation & testing to reduce mercury pollution.

Construct & manage ponds properly to prevent contamination.

Utilize geospatial tools & periodic sampling for management.

Educate on safe practices & provide equipped collection services.

Recommendations

Tailings Reprocessing and Valorization

Raise awareness among ASGM miners about the risks of mixing mercury-laden and mercury-free tailings and using cyanide on mercury-laden tailings.

Promote research, development, and implementation of mercury-free technologies in ASGM.

Ensure access to mercury-free technologies at processing centers.

Mandate mercury removal before cyanidation.

Train ASGM operators on mercury-free techniques or mercury removal methods before cyanidation.

Test and remove mercury from tailings before cyanidation at centralized processing facilities.

Safely dispose of recovered mercury.

Incentivization of Tailings Reprocessing

Governments should support environmentally friendly processing plants for reprocessing tailings.

Ensure proper monitoring of operations.

Map and survey ASGM tailings to identify potential for secondary mineral extraction.

Provide training to ASGM operators for extracting valuable materials from gold tailings.

Monitor minerals extracted from reprocessed tailings, focusing on economically valuable co-products and by-products.

Explore recycling tailings for construction materials to extend the ASM value chain and boost local economies.

Recommendations

Mine Site Management

Collaborate to secure funding for plant decommissioning.

Enforce mine closure and cyanide plant decommissioning policies tailored for ASGM.

Organize educational sessions on restoration benefits and future land use possibilities.

Engage ASGM communities in designing and implementing restoration plans.

Allocate funding or establish partnerships to support restoration activities.

Promote innovative methods like bioremediation for safe disposal and land restoration.

Establish a remediation fund for government-led mine-closure activities if necessary.

Explore partnerships with LSM operators for ASM site remediation.

Encourage LSMOs to collaborate with ASGM through skills and technology transfer.

Utilize knowledge from industrial mine operators to inform ASGM tailings management.

Develop tailings management frameworks for ASM based on LSM best practices

Recommendations

Social Considerations

Collaborate with women and their associations to educate them on safe chemical use, provide personal protective equipment (PPE), and offer safer techniques through finance initiatives.

Support women to work in safe environments outside their homes, without needing to bring their children, through targeted programs addressing their socio-cultural circumstances.

Develop programs with gender-sensitive training, promotion of women in leadership, establishment of women's groups, access to finance, child-care support, health and safety interventions, advocacy, and community engagement.

Ensure new ore processing techniques consider the impact on women in tailings mining, with policies addressing disparities.

Support women throughout the ASGM value chain to enhance benefits, reduce vulnerability to poverty and exploitation, and contribute to sustainable sector development.

Governments should ratify international conventions on child labor and enact national legislation to eliminate it.

Develop interventions to raise awareness about child labor regulations and monitor ASGM settings to enforce them.

Tackle poverty and lack of education, major drivers of child labor, through sustained economic growth and social progress.

Address economic drivers of child labor, ensuring its elimination is integral to sustainable and responsible ASGM development.

Recommendations

Policy and Regulatory Considerations

Develop an international ASM-specific tailings management standard accompanied by sensitization programs.

Urgently develop comprehensive regional frameworks for ASM, emphasizing tailings management, to standardize regulations and improve governance.

Advance and support formalization of the ASM sector, addressing obstacles faced by marginalized groups.

Provide tax incentives for operations adopting environmental best practices, including cleaner technologies and mercury-free processing alternatives.

Harmonize ASM taxes among neighboring countries to deter smuggling of ore and tailings.

Create legal frameworks with specific provisions for ASM tailings management, outlining duties and obligations of operators.

Incorporate Minamata ASGM National Action Plans into national frameworks to enhance mercury reduction efforts and promote safer practices.

Encourage coordination between government agencies, international organizations, and local stakeholders to ensure successful integration of Minamata NAPs.



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PURE EARTH

Promoting Responsible Recovery and Handling of Mercury from Contaminated Artisanal Gold Mining Tailings in Colombia



Alfonso Rodriguez

Technical Director
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Current Problem



- ❑ Coming from illegal mining
- ❑ High concentration of Mercury
- ❑ Representative concentration of Gold
- ❑ Underground Market (30 \$USD to 180 \$USD)/ ton
- ❑ No legislation of tailings management
- ❑ Dilemma hazardous waste or mining material

Pillars

- ❑ Identify **mercury recovery (capture) technology** from contaminated tailings.
- ❑ Develop a business model for the for tailings management (Gold Production).
- ❑ Develop technical protocols for tailings management.
- ❑ Bring the ASGM sector into the formal economy.
- ❑ Develop a regulatory framework for
 - **Tailings management**
 - Legal market for recovered gold,
 - Financial mechanisms for the **mercury storage unit**.
- ❑ Develop a technical protocol Mercury Management, Storage and final disposal.

Improvement of the prototype of the use of copper plates



2019



2021

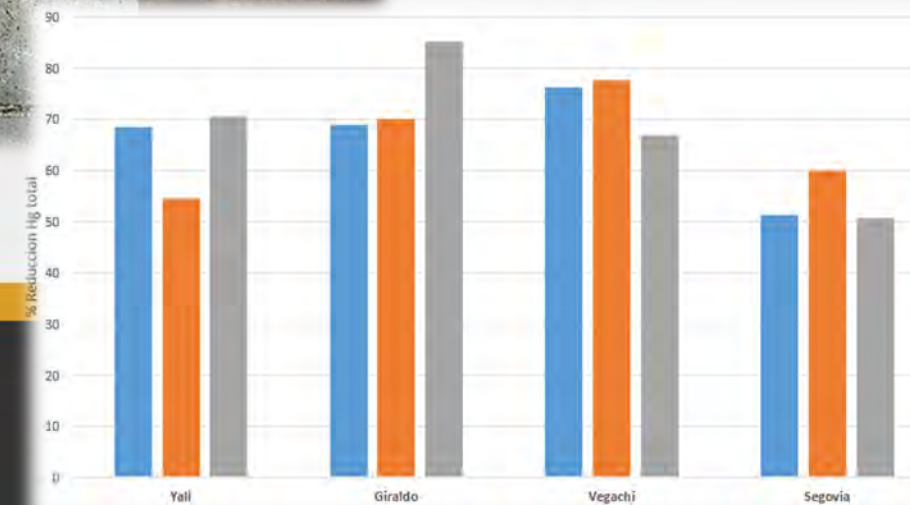
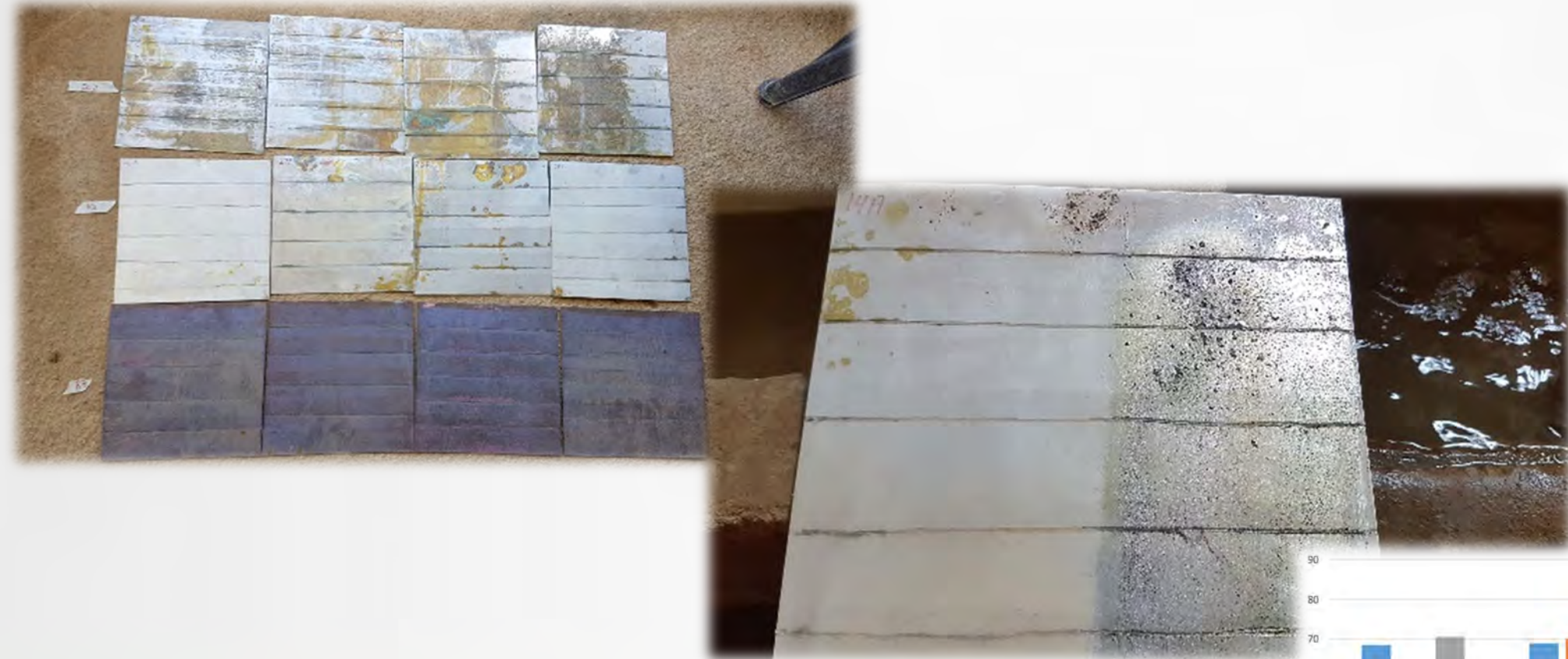


2022



2023

Mercury Recovery from the Environment



Impact of tailings treatment with plates.

Potencial countries for future implementations

- Peru (Madre de Dios)
- Ghana
- Indonesia
- Costa Rica
- Philippines
- Tanzania

Temporary Mercury Storage Unit

First in Latin America

The storage unit is a first step in promoting the responsible disposal of mercury in the country and thereby reaffirming Colombia's commitment to the Minamata Convention.

- It has a temperature range of 2 to 12 degrees Celsius.
- It has additional packaging of the mercury being collected.
- It has a capacity of 300 liters and is maintained at 80% of its total.
- It is of a temporary type, and at the end of the process, it is disposed of in a responsible manner.
- Its operation is in accordance with Colombian legislation



Temporary Mercury Storage Unit

This model is supported by technical protocols for the management of contaminated tailings, supported by ongoing training of miners. With the support of Pure Earth Global and with the commitment of the Pure Earth Colombia team, the work in the search for sustainable solutions for the care of the environment and the health of Colombians is progressing.

The implementation of more units is under review by the Ministry of Environment and other international agencies.



By Numbers

8

Technical documents for managing and storing recovered mercury.

2

New national frameworks for managing and storing recovered mercury.

2

Copper plate modules for processing of mercury recovery from tailings delivered.

1

Mercury Storage Unit for the temporary storage of mercury.

+300

Tons of contaminated tailings processed.

84

Percent of mercury recovered, on average, in ideal conditions from tailings using the copper plates technology.

90

Percent of gold recovered from 200 tons of treated tailings.

+280

Miners trained in tailing management and storage of recovered mercury.

+63

National and international agencies at workshops to manage tailings.

5

Innovative mercury precipitating materials were tested in the cyanidation process.

<https://www.pureearth.org/colombia-proyecto-de-recuperacion-de-mercurio-en-relaves/>

Relevant Documents

Review mercury recovery technologies

Promoting Responsible Recovery and Handling of Mercury from Contaminated Artisanal Gold Mining Tailings in Colombia

Technical Report on Mercury Recovery from Tailings



Funded by:



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With the technical support of:



This publication was funded by a grant from the United States Department of State. The opinions, findings and conclusions stated herein are those of the authors and do not necessarily reflect those of the United States Department of State.

Tailings Management Protocol

Promoting Responsible Recovery and Handling of Mercury from Contaminated Artisanal Gold Mining Tailings in Colombia.

Technical protocol for the responsible management of mercury-contaminated tailings in Colombia.
April - 2022



Funded by:



Implemented by:

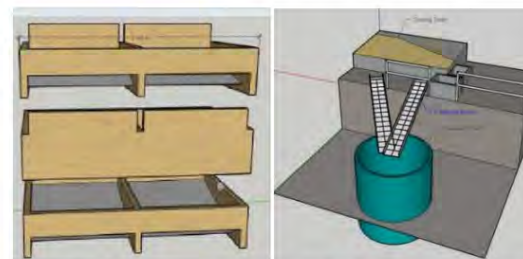


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Copper Plates Implementation - Economic model

Promoting the recovery and responsible management of mercury in contaminated tailings from artisanal gold mining in Colombia

Implementation and economic plan for the use of copper plates
February 2022



Funded by:



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PURE EARTH

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Technical Report Mercury precipitation

Promoting responsible recovery and handling of mercury from contaminated artisanal gold mining tailings in Colombia

Technical report
Results from tests to remove mercury in cyanidation processes
September 2022



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<https://www.pureearth.org/colombia-proyecto-de-recuperacion-de-mercurio-en-relaves/>

Thank You

www.pureearth.org

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