

Measuring global progress towards a transition away from
mercury use in artisanal and small-scale gold mining

By

BRENDA KOEKKOEK

B.Sc.(Eng.), University of Guelph, 1997

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We accept this thesis as conforming
to the required standard

.....
Dr. Krusekopf, Thesis Supervisor
Royal Roads University

.....
Thesis Coordinator
School of Environment and Sustainability

.....
Michael-Anne Noble, Director
School of Environment and Sustainability

ROYAL ROADS UNIVERSITY

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Abstract

A sustainable global program to reduce mercury use in artisanal and small-scale gold mining (ASGM) will require the demonstration of credible, continuous progress to secure political support and financing, and ultimately achieve success. Focused progress measurement has been lacking to date for ASGM at the global level. This research analyses information on appropriate options to measure mercury reduction progress in ASGM. Research methods included a case study of Mongolia, supplemented with information analyzed from semi-structured interviews related to ASGM and other applicable evaluation approaches. The study concludes by proposing the development of a framework approach for measuring progress and by offering guiding principles and recommendations. Recommendations for the framework approach include: on-going and enhanced support to an information database; simplified evaluation metrics for the ASGM Partnership; tracking the level of political commitment of national governments as an indicator of progress; and promoting common reporting metrics across global programming.

Table of Contents

Abstract	2
Introduction	5
Background	7
Artisanal and small-scale gold mining	
Mercury in the global context	
Role of measurement tools to assess progress	
Research Context	12
ASGM Partnership Area	
Artisanal Gold Council’s Mercurywatch database	
Communities and Small-Scale Mining Group of the World Bank	
UNIDO Global Mercury Project	
Looking ahead – the future global mercury treaty	
Methodology	20
Study design	
Part I: National level case study	
Part II: Progress measurement in global initiatives	
Interviews	
Analysis framework	
Results Part I: National Considerations – A Case Study of Mongolia	27
Problem and issue researched	
Background on Mongolia	
ASGM in the Mongolian context	
Mercury use in ASGM in Mongolia	
Main challenges and barriers for reducing mercury use and releases in ASGM	
Actions that have helped overcome the challenges at the national level	
Progress measurement	
How progress might be further facilitated at the national level	
Relevance in the international context	
Results Part II: Tracking environmental progress in multi-stakeholder initiatives	42
Experience to date with ASGM	
Lessons learned in other selected initiatives	

Discussion	52
Global tracking of mercury use	
Tracking progress through the Partnership	
Conclusions and Recommendations.....	59
Works Cited.....	66

Introduction

Artisanal and small-scale gold mining (ASGM) is frequently associated with devastating social circumstances and environmental destruction (Hinton, Veiga, & Veiga, 2003), a central factor in which are the human health and environmental consequences of mercury use in gold processing in ASGM communities. Mercury is a highly toxic substance that has a significant impact on the developing human nervous system as well as on vulnerable ecosystems and wildlife populations, such as fish-eating birds and mammals high on the aquatic food web (UNEP, 2002). Although alternative practices exist that can eliminate or significantly reduce mercury use, artisanal miners often have no affordable available alternative to mercury as their chosen gold extraction technique, and this local reality needs to be understood and considered in the development of policies and programs (Spiegel, 2009).

In order to secure the level of political support and financing to transition to better practices in a sustainable way, it is believed that future programs to reduce mercury in ASGM will require the demonstration of credible, continuous progress. In anticipation of the need to measure advances effectively and efficiently, this research explores key considerations and challenges at the national level through information gained in a national case study of Mongolia. Through further textual analysis of key literature and targeted interviews, it also considers lessons learned in past initiatives and reporting practices under other relevant existing programs to identify possible approaches to measure mercury reduction progress in ASGM in moving forward. The study concludes by offering guiding principles and recommendations for appropriate and efficient measurement approaches to track progress in a global program towards reduced mercury use in ASGM. This research is

timely given the negotiation of a global legally-binding mercury treaty. The research will inform the global ASGM community, the intergovernmental negotiating process for the global mercury treaty and national governments in the development of national ASGM action plans. In addition, themes discussed and lessons learned are applicable to other multi-stakeholder partnerships and development issues, and therefore, the results of the study have application on a broader level.

Background

This background section provides an overview of the ASGM issue and some perspective on addressing mercury in the global context. It also describes the role of measurement tools to assess progress on sustainable development issues.

Artisanal and small-scale gold mining

For the purpose of this report, ASGM will be defined consistent with the draft text for the global mercury treaty, "...gold mining conducted by individual miners or small enterprises with limited capital investment and production" (UNEP, 2012c, p. 17). ASGM is practiced globally in at least 70 countries (Telmer & Veiga, 2005) and provides an important source of income to many poverty stricken people globally (Hinton et al., 2003). Direct occupational health hazards exist for artisanal and small-scale gold miners, such as exposure to mercury, as well as ground failure and machinery accidents (Hinton et al., 2003). ASGM is frequently associated with devastating social circumstances, as well as significant environmental destruction both during and after mining activity is taking place, including the contamination of food sources with mercury (Hinton et al., 2003).

Mercury is generally considered a cheap, reliable, simple, fast and independent way for artisanal miners to extract gold (Telmer & Veiga, 2005). While the particular mining practice employed and amount of mercury used or released will vary significantly depending upon the local circumstance, the basic principle is that mercury is added to ore (crushed rock) to extract gold from the ore (UNEP, 2012a). Due to the nature of the chemical properties, the mercury essentially binds to gold particles in the ore and forms an amalgam together with the gold, a soft mixture of mercury and gold (UNEP, 2012a). To recover the gold, the amalgam is then heated, evaporating the mercury and leaving the gold behind (UNEP, 2012a).

Despite the fact that considerable funding has been directed towards this sector from multilateral organizations and donor agencies over the last decade, there has been limited notable improvement, leading to questioning of the global support efforts and approach (Hilson, 2007). The informal nature of the sector, remote location of many mining communities, transient nature of ASGM communities, variation of local mining circumstances and lack of communication between miners, society and government are described as the characteristics that complicate finding an overall solution to mercury use in ASGM (Telmer & Veiga, 2005). Telmer and Veiga (2005) propose: “An approach that links field knowledge, a field presence, and community economic considerations with international stakeholders may have a chance at success where other efforts have failed” (p. 166).

Mercury in the global context

In February 2009 at the 25th session of the UNEP Governing Council, a landmark decision for the global use and management of mercury was made, based on the impact of mercury on human health and the environment (UNEP, 2009b). At that time, the world’s governments agreed to develop a global legally binding instrument on mercury by 2013 (UNEP, 2009b). They also agreed to strengthen the UNEP Global Mercury Partnership, a multi-stakeholder initiative, as the vehicle for immediate actions on mercury (UNEP, 2009b). These actions are significant for the ASGM issue in particular because ASGM is the largest demand user for mercury globally (UNEP, 2006). In addition, the ASGM sector has recently been identified as the largest source of atmospheric mercury releases with an estimated release of 727 tonnes of mercury into the atmosphere annually, accounting for about 35% of anthropogenic emissions globally (UNEP, 2013).

Formalized in 2008, the UNEP Global Mercury Partnership is a voluntary and collaborative multi-stakeholder initiative where partners work systematically together to protect human health and the environment from mercury (UNEP, 2009a). An ‘Overarching Framework’ governs the UNEP Global Mercury Partnership, and ASGM is one of eight Partnership Areas identified within the UNEP Global Mercury Partnership (UNEP, 2009a). UNIDO and the Natural Resources Defense Council (NRDC) jointly lead the ASGM Partnership Area, with UNEP providing secretariat and administrative support to the overall UNEP Global Mercury Partnership (UNEP, 2012e). There are currently 43 ASGM partners formally engaged at various levels in the ASGM Partnership Area (UNEP, 2012e). The ASGM Partnership Area structures its work through three priority actions that have been identified by the partners, including: (i) supporting efforts of governments to set national objectives/reduction targets for ASGM; (ii) eliminating worst practices in ASGM (whole-ore mercury amalgamation; open burning without mercury capture; and use of cyanide with mercury or after mercury use) and promoting awareness and adoption of cleaner ASGM practices and technologies; and (iii) exploring innovative market-based approaches for artisanal gold mined in a sustainable way (UNEP, 2012e).

At the same time, the global mercury treaty negotiations are underway, and its future provisions are being finalized. While the future mercury treaty is an entry point to address some of the global development challenges associated with mercury and ASGM, the future mercury treaty alone is not mandated to address the broader social, environmental and health issues associated with ASGM. For example, placing a restrictive ban on mercury use for small scale mining will prove counter-productive in mining communities – by making it difficult to legally implement training programs for miners and even forcing government

officials to ignore or punish miners for criminal behaviour (Spiegel, 2009). Research suggests that for, "...the greatest chance at reducing mercury pollution, donors and governments need to approach the issues with an open mind and in an interdisciplinary manner" (Spiegel, 2009, p. 3081).

Nevertheless with the political development of the mercury treaty, there is a promising entry point to address mercury use in ASGM. The profile of the future mercury treaty can be used to foster an effective global ASGM program aimed at long-term sustainable transition to ASGM mercury reduction policies and practices. The term 'global ASGM program' is used in this paper to describe both measures that may be taken as part of government commitments in the future global mercury treaty and other activities and partnerships implemented on a voluntary basis for the sector, such as through the ASGM Partnership Area under the UNEP Global Mercury Partnership and other voluntary actions.

Role of measurement tools to assess progress

Monitoring and evaluation promotes accountability within a program and helps to maximize effective use of development resources (Independent Evaluation Group, 2007). An effective monitoring system combines information from the program, the portfolio and the activities in order to provide an overview of performance towards meeting established objectives and impacts (Independent Evaluation Group, 2007). Environmental goals that are linked to measurable and specific targets have generally seen more progress over others without such measurable and specific (UNEP, 2012d). Monitoring also promotes learning and facilitates decision-making within the program, and evaluation aims to improve performance towards meeting objectives, providing accountability for donors and stakeholders (Independent Evaluation Group, 2007). Evaluation results can be reviewed to

determine whether funding levels are sufficient and whether the program focus should shift to promote program effectiveness (Independent Evaluation Group, 2007).

Research Context

Ultimately, one can assume that the demonstration of continuous progress towards objectives and targets to reduce mercury will enhance global support efforts and provide a strategic structure for financing of future ASGM initiatives. This section provides context for the most relevant international mechanisms currently tracking mercury use in ASGM, including the ASGM Partnership Area of the UNEP Global Mercury Partnership and the Artisanal Gold Council's Mercurywatch database. It also reviews how progress was tracked in past initiatives of global significance, including through UNIDO and the World Bank. Finally, it looks ahead to the anticipated provisions under the future global mercury treaty, specifically those provisions related to ASGM.

ASGM Partnership Area

The ASGM Partnership Area of the UNEP Global Mercury Partnership promotes a goal of 50% reduction of mercury use by 2017 year as an 'aspirational goal' and reports annually into the overall UNEP Global Mercury Partnership on progress related to its three priority actions (UNEP, 2012e). In addition, the ASGM Partnership Area currently incorporates a number of metrics for tracking progress in ASGM globally in its business plan that are listed in Table 1. At the same time, it is acknowledged within the Partnership Area business plan that the metrics used for reporting will differ depending on the activity undertaken and that actual measurements of mercury reductions will be difficult to track and measure (UNEP, 2012e).

Table 1

Metrics for ASGM reporting under the UNEP Global Mercury Partnership

On a field project level, the Partnership encourages implementing Partners to report measureable field project results, such as:

- Number of miners (or other target recipients) trained.
 - Production of awareness raising materials/ training materials.
 - Successful completion of demonstration of alternative technology.
 - Where possible, typical number of kilograms of gold produced by ASGM for one kilogram of mercury used and/or typical emissions reductions achieved.
 - Typical amount of mercury purchased, used and traded by ASGM miners before and after intervention.
 - Availability of environmental quality data in relevant areas.
-

For broader policy-level activities, results indicators could include updates on:

- Number of partners or member countries involved in the Partnership.
 - Numbers of projects/studies conducted by the individual partnership members, with clear indications of how the Partnership supported or facilitated the work, or if the work is independent activity that aligns with Partnership goals.
 - Number of developing countries involved/assisted.
 - Status of data gathering in assisted countries.
 - Delivery of tools and models on national strategies, formalization, technologies and other products that will assist governments and others to promote mercury reductions in ASGM.
 - Successful use of these tools by the intended audience.
 - New opportunities or initiatives that could benefit from Partnership support.
-

Note. Extracted from the ASGM Partnership Area Business Plan, (UNEP, 2012e).

Artisanal Gold Council's Mercurywatch database

The Mercurywatch database collects and analyzes publically available information on ASGM at the national level, including: minimum, maximum and mean ASGM mercury use; mercury import and export data; gold import and export data; as well as the number of chlor alkali facilities at the country level (Artisanal Gold Council (AGC), n.d.). Sponsored in part by UNEP, the Mercurywatch database is a project of the Artisanal Gold Council (AGC), a non-governmental organization, and gathers information from field work, work of NGOs as well as government and mining company reports, and work done by NGO's (AGC, n.d.).

Overall the Artisanal Gold Council records over 70 countries using mercury in ASGM in the Mercurywatch database. Table 2 shows the top 20 countries using mercury in ASGM globally in order of descending use, this list represents 93 % of the total average estimated use of mercury in ASGM as reflected in the *Global Mercury Assessment 2013* and sourced from the Mercurywatch database.

Table 2

Estimated mercury consumption in ASGM for top 20 source countries

Country	Quality of data*	ASGM Mercury use, t		
		Min	mean	Max
China	3	222.3	444.5	666.8
Colombia	3	90.0	180.0	270.0
Indonesia	4	122.5	175.0	227.5
Bolivia	4	84.0	120.0	156.0
Ghana	4	49.0	70.0	91.0
Peru	4	49.0	70.0	91.0
Philippines	4	49.0	70.0	91.0
Sudan	3	30.0	60.0	90.0
Ecuador	3	25.0	50.0	75.0
Brazil	4	31.5	45.0	58.5
Tanzania	4	31.5	45.0	58.5
Burkina Faso	4	24.6	35.1	45.6
Zimbabwe	3	12.5	25.0	37.5
Mali	4	14.0	20.0	26.0
Nigeria	3	10.0	20.0	30.0
Democratic Republic of Congo	2	3.8	15.0	26.3
Guyana	3	7.5	15.0	22.5
Venezuela	3	7.5	15.0	22.5
Mongolia	4	8.1	11.5	15.0
Russia	2	2.8	11.0	19.3
Top 20 countries total		874.6	1497.1	2120
Overall Total Mercury Use in ASGM		910.0	1607.8	2305.6

Note. * 1=presence/absence, no quantitative info ($\pm 100\%$); 2=some indicator of quantity($\pm 75\%$), 3=quantitative data but not within last 5 years ($\pm 50\%$), 4=recent quantitative data ($\pm 30\%$)

It is recognized that information quality is varied in the database, and the data is categorized database according to four levels of accuracy as shown in Table 2. There are definite knowledge gaps that remain (UNEP, 2013). The available information for the 70 countries shows only ten countries with recent quantitative data which is believed to be accurate at plus or minus 30%, 25 countries listed have no quantitative data, 20 countries have some indication of quantity at plus or minus 75% accuracy and 17 have quantitative information but not within the last five years which has plus or minus 50% accuracy (UNEP, 2013).

Communities and Small-Scale Mining Group of the World Bank

Launched in 2001, the World Bank's Communities and Small-scale Mining (CASM) initiative was designed to reduce poverty by integrating multi-disciplinary solutions for artisanal and small-scale mining communities faced with social and environmental challenges as well as by improving the coordination amongst those working in the sector (CASM, 2012). The initiative addresses artisanal and small-scale mining in a holistic way and aims to: provide a platform for coordination and networking amongst stakeholders and make available information on projects, publications, contacts and activities; promote good practices and lessons learned on a hands on basis by developing tools and principles that promote replication; and facilitate fundraising for projects (CASM, 2012). Core funding for CASM was sourced from the Government of the United Kingdom and the World Bank, supplemented from financing from other governments, companies, trade associations and charitable funds (CASM, 2012). Reporting and auditing requirements were defined in the trust fund agreements with sponsors and the World Bank, following the World Bank

procedures and controls for administering funds (CASM, 2012). Provision existed for external reviews performed at the request of the sponsor (CASM, 2012).

In recent years, the future of CASM has been unclear, particularly because it has been difficult to attract financing (CASM, 2012). In a 2010 external analysis of CASM, it was observed that CASM was unable to report on progress sufficiently because of the lack of monitoring and evaluation systems in place and that success was measured anecdotally (Resolve, 2010). A number of stakeholders participating in the review indicated a need for stronger analysis of the impact of CASM for information sharing, network support and policy influence (Resolve, 2010). The review recommended that all objectives for the CASM program be clarified, accountability mechanisms be established and reporting systems be designed that allow transparent information sharing related to progress, challenges and follow through (Resolve, 2010).

UNIDO Global Mercury Project

The UNIDO Global Mercury Project '*Removal of Barriers to Introduction of Cleaner Artisanal Gold Mining and Extraction Technologies*' took place from 2002 to 2007 and began a global response to address mercury releases from ASGM (Mondlane, 2009). The first phase (2002 to 2005) was described as an analytical phase, and the second phase (2005-2007) focused on solutions, including an awareness campaign and training (Mondlane, 2009). The Global Mercury Project was focused in six countries (Brazil, Indonesia, Laos, Sudan, Tanzania and Zimbabwe) and was partly funded by the Global Environment Facility (GEF) with co-financing from the governments involved as well as UNIDO (Mondlane, 2009). A final evaluation of the project was undertaken as part of the project requirements, commissioned by UNIDO. The final evaluation notes that a weakness of the project was that

no monitoring and evaluation process was put in place at the country level, beyond what was required from the GEF (Mondlane, 2009).

The project document specified monitoring and evaluation would be through regular meetings and project implementation site visits and indicated that it was also subject to GEF review processes (Mondlane, 2009). While meeting presentations and mission reports were identified as part of the reporting procedure by project staff, the final project evaluation states that no monitoring and self-evaluation procedures were identified for the project, especially at the country level (Mondlane, 2009). In addition, five out of the six country level final project reports noted that the project implementation was affected by the absence of internal monitoring and evaluation. A number of recommendations and conclusions within the final project evaluation are believed to have relevance to this study, in particular: (i) implementation procedures must be included in the project that include reporting, self-evaluation and monitoring; (ii) diagnostic studies are undertaken quickly to allow projects to start as swiftly as possible; and (iii) project web-site and database usage be set as an indicator of sustainability of project results (Mondlane, 2009).

UNIDO is actively launching new mercury reduction ASGM projects through the GEF, and the first to get started is a regional project in Francophone West-Africa with Burkina Faso, Mali and Senegal (UNEP, 2012f). In addition, financing for a second GEF project with Ecuador and Peru has been secured, and a proposal is under development for Indonesia and the Philippines (UNEP, 2012f). In summary, the main project components for the West-Africa project with UNIDO include: (i) improve understanding of the scope of ASGM in the country; (ii) develop and implement national strategic plans to reduce mercury use; (iii) develop comprehensive health education and technology training programs; (iv)

implement mercury reduction and elimination pilot projects; (v) explore opportunities for fair trade certification; and (vi) document and utilize lessons learned (United Nations Industrial Development Organization, n.d.).

Looking ahead – The future global mercury treaty

The world's governments agreed to develop a global legally binding instrument on mercury by 2013 to protect human health and the environment from its effects (UNEP, 2009b). The global mercury treaty is currently under its final stages of negotiation. A unique article for ASGM has been developed in the draft treaty text (UNEP, 2012c). The draft treaty includes the obligation for Parties with ASGM in which mercury amalgamation is used to extract gold from ore to take steps to reduce and where feasible to eliminate the use of mercury in ASGM (UNEP, 2012c). The proposed ASGM article obligates Parties who have reported ASGM to be more than insignificant to develop and implement national action plans with stakeholders (UNEP, 2012c). According to the draft text, such action plans are to include the following: national objectives and reduction targets; actions to eliminate worst practices; baseline estimates of mercury use and practices used; strategies to promote reduce emissions of and exposure to mercury; strategies for preventing the diversion of mercury for use in ASGM; strategies to reach out to miners; and a schedule for implementing the national action plan (UNEP, 2012c). These Parties would submit their national action plans to the Convention secretariat three years after entry into force of the Convention and provide a review of progress made in meeting obligations under the ASGM article every three years (UNEP, 2012c). As part of the article, Parties are also encouraged to cooperate with one another and with relevant intergovernmental organizations to achieve the objective of the ASGM article (UNEP, 2012c). A comparable obligation exists under the Stockholm

Convention on Persistent Organic Pollutants (POPs) for countries to develop National Implementation Plans under its Article 7 (UNEP, 2001).

Methodology

The author of this paper has worked on issues related to mercury use in ASGM in the UNEP Chemicals Branch Mercury Programme since 2006. In this context, she has coordinated the development of the *Overarching Framework of the Global Mercury Partnership* that governs the Partnership, built networks of stakeholders within the Partnership, and designed and implemented projects in developing countries aimed at achieving reductions in mercury use and/or releases. She also provides UNEP secretariat and technical support to the on-going mercury negotiation process to develop the global legally binding instrument on mercury. Through her experience and contacts in the sector, the author has unique access to a wide network of individuals for conducting the interviews that have been designed into the research.

The goal of the research is to identify appropriate performance measurement approaches to track progress that will facilitate a sustainable global transition away from mercury in ASGM. To achieve these objectives, a literature review was conducted of academic publications and gray literature to identify and examine how mercury use is tracked globally in ASGM and to identify other relevant complex multi-stakeholder initiatives that are faced with such challenges in tracking progress. While the study has a global focus, it was also important to gain a deeper understanding of the issue and the challenges at national levels, hence, national considerations for mercury reductions in ASGM were examined through an explanatory case study approach of Mongolia. The findings of this review process were then supplemented with a series of in-depth interviews conducted with: (i) key international and national experts that have a deep understanding of the ASGM issue and the local situation relevant to the case study; and (ii) individuals with experience working in

other complex multi-stakeholder initiatives faced with similar challenges in tracking progress that could provide insight into the strengths and weaknesses of the progress measurement approaches. A systematic interview approach was followed and comparative data analysis was undertaken with the information obtained.

Study design

It is thought that a future program to reduce mercury in ASGM will require the demonstration of credible, continuous progress in order to secure political support and financing. The research undertaken for this thesis gathers and analyses information on options for measuring progress and offers some recommendations on appropriate measurement approaches to facilitate a sustainable global transition away from mercury in ASGM.

The specific objectives of the research included:

1. To explore and identify appropriate and effective national actions to support transitional activities;
2. To anticipate and analyse appropriate progress measurement requirements and challenges for future global ASGM programming; and
3. To compare and contrast how a number of other complex multi-stakeholder initiatives have addressed performance measurement challenges.

Since the study relied mainly on qualitative information, the research was subject to a number of biases, including researcher and interviewee bias. The proposed methodology incorporates different research methods and may be referred to as mixed methods research (Johnson & Onwuegbuzie, 2004). Data triangulation (through carefully designed interviews and a case study) was an important method to help reduce bias and increase data validity of

the research. The intention of applying mixed research methods in this study was to develop conclusions based on strong evidence and to assist in generalizing overall results, ultimately leading to overall conclusions that might be widely applied to other environmental issues (Johnson & Onwuegbuzie, 2004).

Part I: National level case study

National considerations for tracking mercury reductions in ASGM were examined through an explanatory case study approach of Mongolia. Mongolia was chosen because it has a relatively stable government, a baseline level of ASGM mercury reduction activity to analyze and experience with formalizing miners in a directed program. In addition, there is a general significance of the mining sector to the Mongolian economy, ranking 20th overall in global gold production (High & Schlesinger, 2010). This is a new case study that adds to the available literature.

The purpose of the case study was to analyze in detail what national and local actions and processes have facilitated a transition to reduction and/or elimination of mercury use and releases in Mongolia. Overall, it is anticipated that some of the approaches and the lessons learned in Mongolia may be applied to other countries faced with similar ASGM challenges. A protocol for the case study approach was elaborated, following as a starting point the considerations for critical case-studies outlined by Corcoran, Walker, and Wals (2004). The following protocol was used: problem and issue researched, background on Mongolia, ASG; in the Mongolian context, mercury use in ASGM in Mongolia, main challenges and barriers for reducing mercury use and releases in ASGM, actions that have helped overcome the challenges at the national level, progress measurement, how progress might be further facilitated at the national level, relevance in the international context.

In order to develop the case study, a literature review was conducted. Secondly, information obtained from ASGM Interviewees 1-3, in Part II of the study, that have a deep understanding of the ASGM issue in the Mongolian context was also incorporated. Two of the interviews were conducted by telephone and the other one was through writing (due to language barriers).

Part II: Progress measurement in global initiatives

For the second stage of the study, progress measurement in both ASGM programs and other complex multi-stakeholder initiatives were examined. Two methods of data collection were employed: (1) a literature review of publications that describe the objectives and implementation of such initiatives; and (2) interviews of key stakeholders involved in these initiatives. In terms of the consideration of ASGM programs, the UNEP Global Mercury Partnership, the Artisanal Gold Council's Mercurywatch database, the UNIDO Global Mercury Project and the World Bank's Communities and Small Scale Mining Group (CASM) were reviewed. However as there is limited documented information available related to the adequacy of tracking progress in these initiatives, a series of other multi-stakeholder initiatives were identified that are faced with relevant challenges in tracking progress. Other initiatives that were reviewed include: the WHO Framework Convention on Tobacco Control, the Stockholm Convention on Persistent Organic Pollutants (POPs), the Convention on International Trade in Endangered Species of Wildlife Fauna and Flora (CITES) and the Montreal Protocol on Substances that Deplete the Ozone Layer. The other interviewees shared experiences working on multi-stakeholder development initiatives and programs, including the Diamond Development Initiative, the International Development Research Centre (IDRC), the Canadian Partnership Program of the IDRC and the Climate

Change Impacts and Adaptation program through NRCAN. These other global initiatives were first identified and reviewed in available literature to help identify applicable models for performance measurement that may be applied to support transition away from mercury in ASGM.

Interviews

Based on the global experiences working on ASGM and other large multi-stakeholder initiatives identified in the literature review, primary data was collected through semi-structured interviews with 14 individuals. The purpose of the interviews was to analyze the challenges faced as well as the strengths and weaknesses of the progress measurement approaches used. Furthermore, the interviews drew out information related to the reasoning behind the approaches pursued and allowed a deeper review of approaches over using larger scale statistical approaches such as surveys (Herod, 1993). Interviews also revealed different points of view and collected new information not available in the literature.

Initially participants were recruited from stakeholders (such as government, non-governmental organization and secretariat staff) involved with the initiatives identified in the literature review. Many of the contacts were facilitated through the author's professional network at UNEP and through the UNEP Global Mercury Partnership. Other interviewees were identified during the research. For ASGM, six interviews were conducted with experienced individuals working in ASGM. Many of these interviewees have addressed ASGM from a range of perspectives and have a broad overview of the issues. Table 3 identifies interviewees by background. Results from interviewees 1-3 also contributed to insights in the case study of Mongolia. Interviews were conducted face-to-face wherever possible and by telephone or Skype when necessary. One interview was conducted in

writing due to language barriers. A systematic interview approach was followed and comparative data analysis was undertaken. Overall, the interviews allowed for targeted evaluation of various procedures applied to address similar challenges and barriers. While the interviews were effective in gathering information, the study would have benefited from additional interviews to broaden the insights gained.

Table 3

List of interviewees

Interviewee number	
ASGM experts	Organizational background
1	Mongolia senior government staff
2	technical project manager in Mongolia
3	non-governmental organization 1
4	non-governmental organization 2
5	intergovernmental organization
6	Academic
Other initiatives	Issue background
7	Convention on Trade in Endangered Species
8	Montreal Protocol on Ozone Depleting Substances and other international chemicals Conventions
9	Stockholm Convention on Persistent Organic Pollutants
10	Tobacco Convention
11	Diamond Development Initiative
12	International Development Research Centre (IDRC)
13	Canadian Partnership Program (IDRC)
14	Climate Change Impacts and Adaptation – Government of Canada

Analysis framework

The qualitative research and the case study results are analysed in detail to anticipate and analyse progress measurement options and challenges for future global ASGM programming; to compare and contrast how other complex multi-stakeholder initiatives have addressed such measurement challenges; and to identify appropriate and effective national progress measurement approaches to support transitional activities. Results are analysed from a global tracking of mercury perspective, followed by a review of options for measuring progress on the current objectives of the ASGM Partnership which include: (i) supporting efforts of governments to set national objectives/reduction targets for ASGM; (ii) eliminating worst practices in ASGM (whole-ore mercury amalgamation; open burning without mercury capture; and use of cyanide with mercury or after mercury use) and promoting awareness and adoption of cleaner ASGM practices and technologies; and (iii) exploring innovative market-based approaches for sustainably mined artisanal gold. The study concludes by offering recommendations aimed at promoting a performance measurement framework for ASGM globally with a goal of improving ASGM mercury policies and practices globally.

Results Part I: National Considerations – A Case Study of Mongolia

Problem and issue researched

This case study analyzes in detail what national and local actions have facilitated a transition to reduction and/or elimination of mercury use and releases in ASGM in Mongolia and proposes future actions to support the transition. The purpose is to identify appropriate national progress measurement metrics and processes that can support the demonstration of credible, continuous progress in reducing mercury use in ASGM. Overall, it is anticipated that some of the approaches and the lessons learned in Mongolia may be applied to other countries faced with similar mercury use in ASGM challenges. Information was collected through the analysis of available literature and technical documents and through information gathered and analysed in the semi-structured interviews with recognized experts identified in the methodology section, in particular with three experts with direct experience in the Mongolian context.

Background on Mongolia

Mongolia is a landlocked country, bordering Russia and China, with a population of 2.8 million people and gross national income of US\$2,320 per capita for 2011 (The World Bank, 2012). Traditional economic activity of Mongolia has centered on agriculture and herding livestock. Until 1990, Mongolia's economy and political system was dominated by the Soviet Union. During the 1990s, Mongolia underwent a deep recession, resulting in high unemployment and a significant increase in poverty. Significant livestock die-off occurred between 1997-2002 as a result of severe winters and summer droughts, leading to extreme poverty in rural communities (Singo, 2012).

Mongolia is a sparsely populated country rich in many natural resources. Between 2004-2008, Mongolia experienced an average gross domestic product (GDP) growth rate of almost nine per cent, largely due to high copper prices and increased gold production. Currently, more than 80% of Mongolia's exports are minerals, a figure that is expected to rise to 95% in the coming years, prompting *The Economist* to refer to the country as 'Minegolia' (2012). Mongolia's abundant supply of minerals coupled with its location next to China as the world's fastest-growing and biggest market for most minerals creates a development opportunity for Mongolia, and mining operations, both small-scale and major, are expected to increase in the future (*The Economist*, 2012).

ASGM in the Mongolian Context

Currently, the number of artisanal and small-scale gold miners in Mongolia, commonly referred to as 'ninja miners', is estimated to be 100,000 representing approximately 20% of the rural workforce (Singo, 2012). The miners include 45-50 per cent women (Grayson, 2007). The term 'ninja' is uniquely used in Mongolia and emerged from the common practice of artisanal miners tying a green plastic pan on their back, resembling a ninja turtle of the 1980s television cartoon series (Grayson, 2007). While the number of miners is believed to have been zero in the early 1990s (Singo, 2012), ASGM emerged as an opportunity to escape poverty, in particular for those faced with the significant economic impact of the severe weather systems on their agricultural and livestock herding operations (Hruschka, 2011). ASGM is believed to be taking place in 18 of 21 provinces of Mongolia (Singo, 2012).

Producing an estimated four to seven tonnes of ASGM gold annually (Hruschka, 2011), it is estimated that ASGM miners in Mongolia earn on average \$176 US per month,

approximately 57 per cent above the minimum wage (Singo, 2012). A survey undertaken by the International Labour Organization in two provinces found that mined gold is sold mainly outside legal channels to Korean and Chinese clients, and not to the Mongol Bank as is required by law (Navch, Bolormaa, Enkhtsetseg, Khurelmaa, & Munkhjargal, 2006). While it is believed that miners have an interest in selling their gold to the Bank, significant fees, limited opportunities for selling given significant distance to the Bank offices and poor purification of the gold in ASGM are listed as reasons for miners selling outside of the formal Bank channel (Navch et al., 2006).

Many ASGM operations are family units and often include relatives and friends (Grayson, 2007). Many of the miners are unemployed, students, farm-workers and herders (Grayson, 2007). Hruschka (2011) describes ASGM in Mongolia as a poverty driven cycle, emerging following the loss of employment in other sectors, natural disasters and conflict. In the early days of ASGM, ninja miners were often criminalized and marginalized (Hruschka, 2011). A negative public opinion on ASGM had developed as the result of the unstable situation (Hruschka, 2011).

Mercury use in ASGM in Mongolia

Amongst the ‘ninja miners’, hardrock miners have generally relied on mercury to recover gold, while most alluvial miners recover coarse gold without relying on mercury (Hruschka, 2011). The processing technique varies depending upon the type of ore mined; hardrock miners generally mine veins bearing gold in hillsides, breaking the ore for transportation to the village for further processing, including crushing, milling and gold recovery (Grayson, 2007). It is believed that about half of artisanal miners in Mongolia were hard rock miners in 2005 (Grayson, 2007).

The recognition of increasing levels of mercury use led to various surveys and research aimed towards exploring reduction and elimination of mercury use (Singo, 2012). In addition, an accident at an informal mining operation in 2007 where wastewater with sodium cyanide and mercury polluted the water supply system of Khongor Soum, prompted a fact-finding mission that highlighted the increased risks related to chemicals given the rapid expansion of mining in Mongolia (Joint United Nations Environment Programme / Office for the Coordination of Humanitarian Affairs Environment Unit, 2007). Responding to these increased risks, the Government of Mongolia banned mercury use in ASGM in 2008 (Hruschka, 2011). As a result, official mercury use information is not produced and deemed to be at zero because it is officially controlled (Hruschka, 2011). However, illegal use of mercury still takes place in different areas of the country, in particular in areas where there is no access to a mercury-free processing facility (Singo, 2012). According to the Mercurywatch database, it is estimated 11.5 tonnes of mercury were still used annually in Mongolia in ASGM in 2010, based on an estimated range 8-15 tonnes (Grayson, 2007).

Main challenges and barriers for reducing mercury use and releases in ASGM in Mongolia

Interviewees 1-3 identified in the methodology section have experience in the Mongolian context and were asked to identify the main challenges and barriers for reducing mercury use and releases in ASGM from their perspectives. The specific challenges and barriers in reducing mercury use in ASGM emphasized by the interviewees include: political will and ownership; the rapid growth of the sector in Mongolia; the approach to regulation; and the limited capacity to address and assess the issue.

Regarding political will and the growth of the sector, Interviewee 3 indicated a belief that there was a window in time where the government saw the commodity boom as a

positive opportunity for ASGM that they wanted to develop. At the same time, the interviewee noted that, currently, larger opportunities are gaining more of the focus, such as coal, copper and large-scale gold mining. Currently, he views it as unclear how long the Mongolian Government will continue to address the issue in a serious manner and dedicate resources to it. Interviewee 1 noted that there may be less government interest to address artisanal mining because of the limited perceived opportunity for revenue generation through tax imposition as compared to large-scale mining.

Actions that have helped overcome the challenges at the national level

Interviewees were also asked to identify specific actions that have helped to overcome the challenges in reducing mercury use and releases in Mongolia. The specific actions emphasized include national policy interventions, advocacy and awareness, as well as capacity building efforts, specifically technical interventions such as the Bornuur mercury-free processing facility and large-scale development projects such as the Swiss Development Cooperation (SDC) Sustainable Artisanal Mining Project (SAM). This section explores the specific actions emphasized based on information obtained through the interviews and information available in the literature.

National policy interventions

The Government of Mongolia has demonstrated political will to address the issue of mercury use in ASGM. The first ASGM policies were developed in 2008 when a ban on mercury use was imposed (Singo, 2012). While all three of the interviewees noted that the regulation of ASGM is a challenge faced by the government, the 2008 ban of mercury use in ASGM was perceived as both a positive and negative step taken by the government. Overall, the interviewees generally viewed the mercury ban as a positive intervention towards

protecting human health and the environment, but at the same time, they also expressed significant concerns for the capacity to both implement and enforce the mercury ban effectively. Specifically, Interviewee 1 indicated the ability to enforce the ban at the local level was weak, and Hruschka (2011) describes the mercury prohibition as “unfortunately a typical case of a well-intentioned environmental requirement, which by lack of practical feasibility is not enforceable” (p. 37).

In terms of implementation of the ban, concern was expressed by the interviewees for the capacity of the local community to overcome the technical challenges to implement the ban. Ability to provide technical assistance to miners that are operating illegally is limited and was noted as a significant barrier to fostering change by all interviewees. Related to this, the need to build a positive relationship with miners when engaging with them was highlighted by Interviewee 3, and again, the challenge of positive engagement under illegal circumstances was raised.

Advocacy and awareness

Advocacy and awareness were highlighted by two interviewees. Interviewee 2 highlighted the important advocacy aspect that the SAM project brought in changing the political will in the country to address the issue. He emphasized that the advocacy, lobbying and information sharing associated with the SAM project raised awareness about the issue with the government and played a role in changing attitudes towards the issue. Interviewee 3 highlighted that the Mongolian Government got informed about the issue, through avenues like the SAM project and the global mercury Convention negotiation, and explored their options to address the issue.

In addition, available literature highlights a number of examples of how the international World Bank's Communities and Small Scale Mining (CASM) Annual Conference hosted in Ulaanbaatar in 2007 helped build awareness at the national level and lay the groundwork for action. Most notably, following the Conference, miners from Bornuur are said to have concluded, based on learning about experiences in other countries, the value of becoming more organized and of formalization (Hruschka, Tumursukh, Pokharel, Hofer, & Hancock, 2009). The resulting Bornuur Artisanal Small Scale Miners Association (BASMA) pooled their collective resources and made the case to develop a mercury-free processing facility together with the SDC (Hruschka et al., 2009).

Capacity building

Technical demonstration projects

Positive examples from the field were described by the three interviewees as playing an important role in overcoming the challenges, allowing for the positive showcase of success and providing hope to both the miners and the Government. Interviewee 3 noted that the technology developments get miners interested, and further actions can build on this. In particular, the Bornuur mercury-free processing facility developed through the SDC SAM project was highlighted by the interviewees as a particularly helpful initiative, producing approximately \$5 million US annually and directly benefiting local citizens (Singo, 2012). Furthermore, the mid-term report of the SDC project in 2009 describes the Bornuur example as supporting entrepreneurship and playing a service centre type of role for the miners of the association (Hruschka et al., 2009).

International support

While a number of varied international efforts have been undertaken on ASGM in Mongolia, the SAM project was emphasized by the interviewees as pivotal in helping Mongolia to overcome the challenges associated with ASGM. In addition to its role noted above in supporting advocacy and demonstration projects, the significant emphasis of engagement of miners in the project was observed by the interviewees, noting that the miners are the ultimate drivers of change. Interviewee 2 observed that the SAM project aligned itself with Mongolian government policy and also challenged the government. He noted that by continuing the program for seven years now, the project has also been influential in engaging change agents at many levels, including providing support for the Bornuur mercury-free processing facility and supporting national policy development. The interviewee further indicated that the Swiss supported SAM project helped provide an external perspective that is both neutral and objective. The required monitoring and timelines of the external Swiss project has played a role in keeping actions on track.

To summarize the project, the SDC initiated the SAM project in 2005, and it is currently in its third phase (Hruschka, 2011). It is a development project that was initiated as a means to support rural populations coping with the devastating loss of livestock (Singo, 2012). It touches on various aspects of ASM including: legalization, formalization, capacity building, organization, safe workplaces, social security, eco-friendly technologies, local development and access to finance (Hruschka et al., 2009). The SAM project built on experiences and lessons learned in previous SDC projects in Ecuador and Bolivia, incorporating formalization of artisanal miners as a building block for responsible and sustainable ASGM (Hruschka, 2011).

The third phase has an overall project budget over four years of 4.5 million Swiss Francs from SDC and US\$933,800 of in-kind contribution from the Mongolian Government (Swiss Agency for Development and Cooperation SDC & Ministry of Mineral Resources and Energy of Mongolia, 2011). “Recognition of artisanal mining as a formal sub-sector contributing to Mongolia’s economic development” is the development goal of the current third phase of the SAM project (Swiss Agency for Development and Cooperation SDC & Ministry of Mineral Resources and Energy of Mongolia, 2011). Project objectives have evolved over the three phases of the project. Phase three includes two project outcomes: (i) secure workplaces are provided through responsible artisanal mining, and (ii) improvement of artisanal mining communities environmental and social responsibility as well as livelihoods (Swiss Agency for Development and Cooperation SDC & Ministry of Mineral Resources and Energy of Mongolia, 2011).

Progress measurement

There is currently no measurement of overall mercury reductions at the national level in Mongolia as its use is officially banned. In addition, Mongolia is not a partner in the Global Mercury Partnership and therefore does not report to the Partnership on progress. Interviewee 2 indicated that the most significant progress measurement is currently integrated through the programmatic needs of the SDC, as the major project funder. Progress of the project is monitored at the activity level and documented through semi-annual reports, focusing on output and outcome level. Reporting is based mainly on milestones (reached or not reached status) in order to avoid significant extra workload (Swiss Agency for Development and Cooperation SDC & Ministry of Mineral Resources and Energy of Mongolia, 2011). At the pilot processing sites, baseline studies are carried out in order to

track progress at the outcome level (Swiss Agency for Development and Cooperation SDC & Ministry of Mineral Resources and Energy of Mongolia, 2011). At the same time, an estimation of overall annual mercury use in 2010 has been developed by the Artisanal Gold Council and is included on the Mercurywatch database, together with official mercury and gold import and export data. There is no analysis provided through the Mercurywatch database of the mercury use estimations over time.

In looking ahead, Mongolia would have reporting obligations related to ASGM under the future Convention on mercury if it were to become a Party. Specifically, these obligations are likely to include the need to: report on progress in implementing the provisions of the Convention and report if at any time whether artisanal and small-scale gold mining and processing in Mongolia is more than insignificant (UNEP, 2012c). If it is deemed more than insignificant, Parties will be required to develop a national action plan aimed at reducing mercury use and releases in ASGM (UNEP, 2012c).

How progress might be further facilitated at the national level

Interviewees were asked how progress might be further facilitated in Mongolia. This section describes four specific recommendations extracted from the interviews and explores rationale behind the recommendations.

- *Recommendation 1: Construct more mercury-free processing facilities.*

All three interviewees indicated the need to construct more mercury-free processing facilities to meet demand for mercury-free processing. Interviewee 2 highlighted that when there is easier access to process facilities, there is less probability of mercury use, stating that a 200 km radius to a processing facility is realistically too far for miners to go. Overall, the location and number of mercury-free processing facilities should be influenced by

availability of willing investors as well as supply and demand variables (Singo, 2012). Also, the SDC mid-term review in 2009 indicated that it is important to understand and analyse the Bornuur facility success factors, replication depends on commitment to community development and strong ownership structures (Hruschka et al., 2009).

Interviewee 3 indicated that additional facilities will require access to capital and a facilitative regulatory environment. In this context, Interviewee 2 noted it was promising that about ten other mercury-free facilities have been established and financed privately by miners themselves following the Bornuur model. Interviewee 2 said that such replication is a positive development and highlighted that these other facilities are cheaper and smaller than the demonstration project developed as part of the SAM project.

- *Recommendation 2: Develop a domestic market for gold.*

Two of the interviewees emphasized the need to improve the domestic value chain for gold, indicating there is a need to develop their domestic market to refine gold to 24kt in order for the gold to be sold within legal channels. Without inclusion of ASGM in the formal economy, it is recognized that it is difficult to finance mercury reduction efforts in a sustainable way (UNEP, 2012b). An International Labour Office baseline survey conducted in 2006 showed that while gold miners would like to sell gold to commercial banks, it is difficult for the miners to meet the law on procedure of the bank for buying (Navch et al., 2006). The minimum quantity of gold for evaluation by the Mongol Bank is one kilogram which is significant (Singo, 2012). The two interviewees suggested that a mercury-free refining facility should be constructed in Mongolia in order to build the capacity of miners to access the national market. In addition, the study suggests that given the distance of mining

sites to urban areas, it is also a challenge for miners to reach such commercial banks and that mobile bank services or legal mediators could be introduced.

- *Recommendation 3: Strengthen governance and leadership.*

The need to strengthen governance and leadership was also highlighted by the interviewees. The 2009 mid-term evaluation of the SAM project states that the miners association needs to be strengthened and empowered in order to ensure sustainability over the long-term, in particular through the establishment of a national federation of artisanal miners driven by miners (Hruschka et al., 2009).

Interviewee 2 suggested that a national plan to facilitate the transition away from mercury might be helpful tool that could help focus on mercury reductions and not the ban. Under the future mercury Convention, the development of a national action plan is likely to be an obligation of Parties to the Convention. UNEP (2011a) has developed guidance for development of such plans, based on experiences in the Philippines and Cambodia, which could prove useful to Mongolia in undertaking such an exercise.

In addition, increased engagement at the regional and global levels was highlighted by Interviewees 1 and 3. Interviewee 1 indicated the general value in working together at the international level to reduce and eliminate mercury use. Interviewee 3 emphasized the value in regional outreach and collaboration. This was reinforced by Interviewee 5 who indicated that UNIDO, in the development of its current round of ASGM project proposals to the Global Environment Facility (GEF), is designing regional hubs into the work programs. The purpose of this approach is to promote cost effectiveness and promote replication of projects for scale-up. Interviewee 5 further emphasized the important complement that the UNEP

Global Mercury Partnership can bring to ASGM projects because it promotes efficiency, eliminates overlap and allows partners to draw upon a pool of experts.

- *Recommendation 4: Address waste management.*

One main difference between ASGM and large scale gold mining is that the ASGM sector does not generally practice waste management, often leading to contaminated sites (UNEP, 2012a). Interviewees 2 and 3 noted the need to address waste management through establishing tailings management systems as soon as possible in Mongolia. Interviewee 3 indicated that tailings management is required in order for the processing cycle to be fully sustainable. Interviewee 3 further indicated that the tailings are an environmental issue, with risk of leakage of mercury and other toxics into local waters that needs to be prevented. The 2007 accident at an informal mining operation where wastewater with sodium cyanide and mercury polluted the water supply system of Khongor Soum is an illustration of this. Interviewee 2 said that tailings management will help address the whole value chain of gold, indicating additional profit may be made from the gold that is currently lost in the tailings.

Relevance in the international context

“There is no ‘quick fix’ to the ‘mercury problem’ of ASGM, because it is not a ‘mercury problem’ but a formalization challenge” (Hruschka, 2011, p. 5). Mongolia’s experience with implementing the mercury ban starting in ASGM in 2008 is a true example of this. Interviewees all agreed that while the intentions behind the ban were commendable, there are definite challenges in implementing it. At the forefront from a mercury tracking perspective is the limitation a ban puts on the ability of national governments to track information on the use and release of mercury. In Mongolia, as is the case in other countries with bans in place, official mercury use information is not produced and deemed to be at zero

because it is officially a banned substance. In this context, a third party assessment of mercury use at the national level, such as what is done through the Artisanal Gold Council's Mercurywatch database, will continue to be a helpful tool in supporting a realistic understanding of the issue and in promoting international efforts overall.

With respect to recommendation 1 to construct more mercury-free processing facilities, this is particularly relevant to any country that has placed tight restrictions or bans on mercury use. Experience in Mongolia demonstrates that when a ban is in place, the value of tracking the distance to or number of miners with access to a mercury-free processing facility is a particularly relevant indicator of progress. Governments that follow other policy approaches may consider other performance indicators more relevant, depending on the local situation.

In order to construct 'more' facilities, positive examples to replicate must first be developed, as is the case with the SDC funded Bornuur facility, and accessing financing is essential in supporting such transition to cleaner technology (UNEP, 2011b). National budgets in the gold producing countries, multilateral and bilateral funding and private investments are the main sources of financing currently identified (UNEP, 2011b). Further scale-up of initiatives is likely to be dependent upon miners being formalized and, hence, having access to financial resources (UNEP, 2011b).

Concerning recommendation 3 strengthening governance and leadership, a number of suggestions have been made for the future in Mongolia including: (i) the establishment of a national federation of artisanal miners; (ii) the development of a national plan to facilitate the transition away from mercury; as well as (iii) increasing engagement at the regional and global levels. Understanding the national policy approach and market conditions is

important in designing programs and projects. It could be helpful for the UNEP Global Mercury Partnership, or other entity, to proactively track progress for such process items as a means of enhancing support for Governments to set priorities and make progress on the issue, one of the three objectives of the ASGM Partnership.

Without inclusion of ASGM in the formal economy, it is recognized that it is difficult to finance mercury reduction efforts in a sustainable way (UNEP, 2011b). Recommendation 2 to develop a domestic market for gold is important for countries with challenges including ASGM in the formal economy. While this does not directly imply a reduction of mercury use, efforts related to formalization should be promoted because “the lack of formalization in ASGM is widely considered a barrier for miners to implement changes” (UNEP, 2012b, p.1). Furthermore, recommendation 4 addressing waste management aims to support a sustainable processing cycle and to reduce risks. Waste management efforts will support efforts to meet certification schemes for gold, such as the *Fairtrade and Fairmined Standard for Gold from Artisanal and Small-Scale Mining, including Associated Precious Metals* which has requirements for good waste management practices (Alliance for Responsible Mining Foundation, 2010). The *Fairtrade and Fairmined Standard for Gold from Artisanal and Small-Scale Mining, including Associated Precious Metals* certification process encourages miners to operate in the formal economy and supports miners to receive a premium payment for the gold which is reinvested in community projects. Mongolia, having a well developed program to address ASGM since 2005, is well positioned to start addressing the issue of waste management and build capacity for miners to take part in certification schemes.

Results Part II: Tracking progress in global multi-stakeholder initiatives

Semi-structured interviews with experts, identified in the methodology section, were conducted to consider the challenges faced in tracking mercury reductions in ASGM globally as well as to analyze the strengths and weaknesses of progress measurement approaches in other programs. It is believed that the interviews helped to draw out information that is not available in current literature. Results are separated into two sections: experiences to date with ASGM and lessons learned in other selected initiatives.

Experience to date with ASGM

This section compiles information gathered from the six interviews with ASGM experts. First from a global perspective, it reviews perspectives on tracking mercury reductions. Themes aligned with the Mongolia case study were also explored, including challenges and barriers in addressing mercury reductions, actions that have helped overcome the challenges and how progress may be further facilitated.

Tracking mercury reductions

Mercury use data was broadly recognized by all interviewees as an ideal measurement metric in tracking mercury reduction progress globally. The Global Mercury Partnership metrics were also noted by several interviewees as a helpful set of indicators in marking progress. Even so, it was also widely understood that the robust field programs required to track mercury reductions and other Partnership metrics do not currently exist, and there is a general lack of resources to track mercury reductions in an effective manner. At the same time, the Mercurywatch database was noted by several interviewees as a promising initiative that is providing a systematic way to estimate mercury use per country.

With respect to measuring progress in past large scale programs, the limited long-term measurement of results was acknowledged by some interviewees. Interviewee 6 noted that projects of short duration generally spend too much time understanding what is going on and not enough time on changing behaviour. In addition, the interviewee noted the difficulty in measuring the intangible aspects of projects and the lack of evaluation of the sustainability of projects. In looking forward, Interviewee 4 suggested that progress measurement needs to start simple for the Global Mercury Partnership given its infancy. The interviewee suggested metrics such as number of countries engaged in the Partnership, awareness about the program and demand for support under the Partnership might be appropriate to consider.

Main challenges and barriers for reducing mercury use and releases in ASGM

Several challenges and barriers in reducing mercury use in ASGM were emphasized by the six interviewees, including: social complexity and understanding of the ASGM issue; political will and ownership; project design coupled with the limited capacity (expertise and resources) to address the sector. In emphasizing social complexity and understanding of the issue, Interviewee 4 said that the social barriers are significant and making changes in economic systems is difficult. In addition, the scale of the issue with 10-15 million miners working globally in remote and dispersed areas was noted.

Actions that have helped overcome the challenges

Interviewees noted a number of actions that have helped to overcome the challenges related to mercury reductions in ASGM. Most notably, awareness-raising and advocacy efforts were highlighted as helpful in building political understanding and ownership of the issue while technical field projects were observed as supportive in building the required capacity to facilitate change.

Advocacy and awareness-raising.

Interviewees noted a number of advocacy and awareness-raising activities that have helped to build political understanding and ownership of the issue. In this context, the mercury treaty negotiations were noted by all interviewees as particularly helpful in drawing attention to the issue. Interviewee 5 indicated that because of the treaty negotiations ASGM is now recognized as a sector requiring attention and noted the promise this brings to miners. The Global Forum hosted by the Global Mercury Partnership in 2010 and the Annual CASM Conference were highlighted by a number of interviewees as helpful opportunities to exchange information and build momentum for action. The UNEP Global Mercury Partnership was also noted as a valuable advocacy mechanism in supporting change by a number of interviewees, though the lack of sustainable financing for the Partnership was highlighted by Interviewee 4.

Technical field projects.

Technical field projects were consistently highlighted by interviewees as a fundamental action to help overcome the challenges to achieve mercury reductions. The CASM and UNIDO field experiences were valued by all interviewees. It was noted that these projects have built local capacity for change, through training experts and developing concrete examples of success to build upon. Interviewee 3 acknowledged that field projects and resulting working relationships with miners are fundamental in collecting quality data required for tracking progress. In addition, the Partnership was noted by Interviewee 5 as a valuable coordination network for experts and efforts, producing valuable guidance materials to support the sector and fostering efficiency in international efforts that provide support to training efforts.

How progress might be further facilitated

In terms of improving data, Interviewee 3 said that better field relationships with miners through field projects would help generate better data. Interviewee 5 noted that the UNEP Global Mercury Partnership could play a more active role in collecting relevant data, indicating that non-governmental organizations in particular have a lot of helpful information available. Interviewee 5 indicated that other data is available such as health data and child labour statistics from some partners that is not in any one particular work mandate, but it is, in any case, helpful and collectively the Partnership can play an active role in working on this.

Interviewee 4 suggested that, for the moment, it is most appropriate to track progress at the project level given that actions under the UNEP Global Mercury Partnership are not currently far enough advanced or adequately resourced to track mercury reductions. Interviewee 4 further noted that it was perhaps most appropriate to focus on tracking reductions from the largest source countries and regions in moving forward, given the limited resources available and the significant amount of resources required to track mercury reductions well. The interviewee also indicated that there will be a need to monitor effectiveness of the future mercury Convention in the future and suggested that it would be strategic for the Conference of the Parties to set up an evaluation process specific to ASGM, given the significant use of mercury use in the sector and complexity of the issue overall. Such a review process could be set-up a country by country basis to review national level progress through UNEP and third party evaluators.

Governance was brought forward by several interviewees as an important underpinning for fostering change. It was observed that governments require a certain level

of stability to address the sector and that Governments must have a sense of ownership and responsibility to address the issue in order for sustainable change to happen. A number of interviewees highlighted promise in the development of the Philippines National Strategic Plan to reduce mercury use in ASGM, indicating that it scaled up the government ownership of the issue and engaged all stakeholders. Interviewee 4 indicated that complacency is a challenging hurdle to overcome, and in some cases, a catastrophe needs to happen to motivate change. This is illustrated, for example, in the drought conditions noted in the case study of Mongolia. In terms of strengthened governance, the same interviewee noted promise in the Tanzanian model of including ASGM efforts in the national poverty reduction strategy. The potential for increased resources and attention to the issue is promising, while at the same time, it was noted that progress has been slow and that it is too early to tell if this will effectively support change at the national level.

Summary of lessons learned to date in ASGM

The interviews confirm that progress measurement in ASGM needs to improve in current programming and over previous programs, such as CASM and the UNIDO Global Mercury Project, in order to track global progress effectively. Currently without a robust global program, it will remain challenging to track progress at the global level through the Global Mercury Partnership, in particular with lack of resources and limited field interventions. At the same time, the Artisanal Gold Council's Mercurywatch database is emerging as a promising initiative at the global level that is providing a systematic third-party method to track mercury use and could be further shaped by the international community to help inform decision-makers, set strategic priorities and track overall progress.

Lessons learned in other selected initiatives

A number of other selected multi-stakeholder initiatives were analyzed through semi-structured interviews to consider different evaluation approaches that may be applicable to supporting mercury reductions in ASGM. In total, eight interviews were conducted with experts identified in the methodology section. In each of the initiatives considered, the interviewees noted that monitoring of progress was an important element of the initiative and at the same time a challenge to undertake effectively with limited available resources. This section relays observations gathered from the most relevant interviews, including reporting processes and mechanisms for analyzing progress.

Reporting Processes

A number of interviewees acknowledged that complex development initiatives do not necessarily have an applicable one size fits all reporting process. Many interviewees noted the need for simplicity and flexibility in project reporting, and at the same time, most of the interviewees acknowledged value in developing measurement tools for projects to report on progress. This section provides insights regarding project reporting processing as well as processes under international legally binding instruments.

Project level.

Interviewee 12 indicated that project implementers tend to benefit from having a structure for project reporting, if only to get the job done. The IDRC uses a project completion report as a reporting tool that is not necessarily a full project evaluation. Furthermore, Interviewee 13 indicated that the Canadian Partnership Program under the IDRC uses self-evaluation in their project reporting process. The thinking is that if program level learning is important, it is very important from an organizational perspective for staff to

review project outcomes as part of a learning exercise. It is also viewed that self-evaluation can relieve some of the power dynamic that can play into a fully independent evaluation process and does not preclude independent evaluation.

A number of references to the lack of learning from project evaluation were made. Interview 13 said that the Canadian Partnership Program uses knowledge workshops as a mechanism to share information gained in knowledge driven projects. Interviewee 12 indicated that for capacity building projects a certain amount of risk may need to be taken in developing projects and that related targets can be directed at knowledge, not necessarily a particular outcome related to change-making.

International legally binding instruments.

Interviewees 7-10 shared experiences with respect to reporting processes under legally binding instruments. In all four of the Conventions considered, the Parties to the Convention report on their obligations to the relevant Convention oversight body in a specified reporting format. However, there is no mandate within the Convention for the oversight body to undertake a thorough review or analysis of the information submitted.

For the Stockholm Convention, Parties are required to develop national implementation plans (NIPs) to demonstrate how the obligations of the Convention will be implemented (UNEP, 2001). Interviewee 9 noted that in developing the NIPs for the Stockholm Convention, a process milestone chart to track NIP development phases was used by some implementing agencies to support governments as a method to track country phases of progress in NIP development, highlighted in Table 4 below. Though it was not used from the outset, the interviewee said that it helped provide a common structure to guide countries in NIP development. The interviewee further indicated that this phase tracking system was

efficient, well aligned with the GEF reporting cycle, under which many NIP projects were funded, and would have helped track and compare country progress in NIP development, for the countries where it was used.

Table 4

Summary of National Implementation Plan Development Phases

Phase 1	Establishment of a coordinating mechanism and a process organization
Phase 2	Establishment of POPs inventories and assessment of national infrastructure and capacity
Phase 3	Priority assessment and objective setting
Phase 4	Formulation of the NIP
Phase 5	Endorsement and submission of the NIP

Note. Extracted from ‘Guidance for developing a National Implementation Plan for the Stockholm Convention’ (UNEP; 2001).

Global mechanisms for analyzing overall progress

The Mongolia case study highlights the limitation a mercury ban puts on the ability of national governments to track information on the use and release of mercury. In this context, a third party assessment of mercury use at the national level will be a helpful tool in supporting a realistic understanding of the issue globally and in promoting international efforts overall. The interviews highlighted two helpful third-party review models used for trade in endangered species and global tobacco programming.

The NGO TRAFFIC promotes cooperation at the international level to address wildlife trade issues, with emphasis on CITES. Interviewee 7 indicated that TRAFFIC is effective because it has a focused mandate on trade in endangered species and does not deal with other issues, even though there has been pressure to broaden the mandate. The

interviewee further noted that TRAFFIC has solid know how to support implementation of CITES and is well respected and funded. The interviewee said that TRAFFIC brings a double role into the process, both challenging and alarming with a semi-official status in CITES. TRAFFIC's relation to CITES is set out in a memorandum of understanding with the Convention secretariat.

In global tobacco programming, Parties to the WHO Framework Convention on Tobacco Control report on progress in meeting obligations under the Convention to the Conference of the Parties. The Conference of the Parties releases periodic status of implementation of the Convention reports based on the information submitted by the Parties to the Convention. Interviewee 10 said that these reports are useful in finding commonalities amongst countries at different stages of implementing the Convention. In a separate complementary process, the WHO publishes a Global Tobacco Report which scans the world against compliance reports submitted under the Convention and data from other sources such as from NGOs, academia, WHO and national health ministries. The interviewee indicated that the analysis provided within the Global Tobacco Report is pivotal in helping WHO strengthen the system of implementation for Tobacco control globally. While the interviewee indicated that the duo-reports were considered to be a bit cumbersome for countries in the beginning, the interviewee indicated that the countries are getting used to it now.

Summary of lessons learned in other areas

Based on experiences with reporting processes under legally binding instruments, there is a limited challenge role for the Convention governing body to encourage progress, leaving room for complementary processes to enhance review of country level progress beyond reporting obligations within the Convention. TRAFFIC and the WHO Global Tobacco Report are interesting models for promoting accountability and making progress. Futhermore, experiences with the development phases developed for the Stockholm NIP process were useful in identifying the status of the NIP per country. Finally, there are interesting project reporting lessons from IDRC and its CPP, in particular the utility of self-assessment in promoting learning and scaling up.

Discussion

From an overarching perspective, it is clear that past global programs through UNIDO and CASM, though they included successful actions, lacked reporting, self-evaluation and monitoring components required to review progress sufficiently. Currently, the Global Mercury Partnership is not equipped to measure progress. Overall, there is a need for stronger analysis of the impact in order to facilitate learning and to promote the required accountability to maximize effective use of limited development resources. The discussion section first reviews the global tracking of mercury use in ASGM since it is clearly a facilitative metric for tracking progress and then considers progress measurement as it relates to the current Partnership objective and priority actions.

Global tracking of mercury use

At the global level, the Mercurywatch database, housed at the Artisanal Gold Council (AGC), is the only entity that tracks national mercury use in a systematic way. It is considered a contribution to the Global Mercury Partnership and was generally recognized by interviewees as a promising initiative that is tracking mercury use in a transparent and independent way at the global level. The Mongolia case study reinforces how important independent assessment is in the sector, given that official government data related to mercury use of zero tonnes does not reflect the Mercurywatch estimate of 11.5 tonnes of annual use.

In Mercurywatch, data is collected from field work, work of NGOs as well as government and mining company reports. This type of model for data collection has proven useful in areas such as tobacco control and trade in endangered species where reviews outside of the formal Convention reporting are conducted. The external reviews support

decision-making and priority setting on the respective issues. In this context, the Mercurywatch database and its network of contributing experts, or such a model, could be considered well positioned to provide a global tracking platform and, ultimately, support decision-making about global programming and implementation of the Convention. At the same time, the Mercurywatch database is currently a modest initiative with limited capacity to fully undertake such a challenge without increased funding support.

Tracking progress through the Partnership

The ASGM Partnership Area promotes an aspirational target of 50% reduction of mercury use by 2017 year as an ‘aspirational goal’ (UNEP, 2012e). It is identified as an ‘aspirational goal’ because of the general lack of reliable use and trade data (UNEP, 2012e). The baseline data is so uncertain it is challenging to even set a numerical target at the global level at this stage. Recent quantitative data is available in only ten of the over 70 countries believed to have ASGM (UNEP, 2013). Overall, emission estimates need more field information in order to be more accurate and to support the development of achievable and measurable mercury reduction targets (UNEP, 2013). The development of a target is beneficial because in programs where there are specific and measurable targets established, more progress has generally been made (UNEP, 2012d). With expanded capacity for the Mercurywatch database or similar entity, such data could eventually be used to track mercury use in ASGM over time in a more official way.

The remainder of the discussion section is centred on the current priority actions of the ASGM Partnership: (i) supporting efforts of governments to set national objectives/reduction targets for ASGM; (ii) eliminating worst practices in ASGM (whole-ore mercury amalgamation; open burning without mercury capture; and use of cyanide with

mercury or after mercury use) and promoting awareness and adoption of cleaner ASGM practices and technologies; and (iii) exploring innovative market-based approaches for sustainably mined artisanal gold.

Priority action 1 - Supporting efforts of governments to set national objectives/reduction targets for ASGM

The need to strengthen governance and leadership was consistently highlighted in the interviews as an underpinning to change-making in ASGM. From a Partnership reporting metric perspective, the number of member countries involved would be an appropriate and helpful reporting metric for this area. Additionally, strengthened governance and leadership was a recommendation made in the Mongolia case study. In this context, it seems that there would also be value in tracking the scope of national government ownership of the issue in a structured way in moving forward. Given that national action planning for ASGM is expected under the future mercury treaty, the lessons learned in applying NIP development phases under the Stockholm Convention may be a useful overall approach that could be adapted for tracking of progress of ASGM national action plan development per country.

Table 5 outlines proposed process phases adapted to the current ASGM situation. The Partnership could map out the stage of political will and ownership per country in a comparable way as a means to support decision-makers to set priorities for providing support to countries in this area. Inventory development is included in the process phases. Including the inventory data in the development phase could be one source of information for consideration in the global mercury database.

Table 5

Proposed process phases steps for ASGM national action plans

Phase 1	Establishment of a coordinating mechanism and a process organization
Phase 2	Undertake a situation analysis, including an inventory
Phase 3	Priority assessment and objective setting
Phase 4	Reported whether ‘ASGM and processing is more than insignificant’ to the future mercury Convention oversight body. This will presumably need to be signalled to the oversight body for the mercury treaty, and it could be considered a place where national political support is signalled.
If ASGM is deemed more than insignificant by the country, the Partnership would proceed to track phases 5-6.	
Phase 5	Formulation of the plan, including costs
Phase 6	Endorsement of the National Action Plan by Government and submission to the oversight body of the future treaty, within three years of entry into force of the treaty for the country.

Looking specifically at the Mongolian context in setting national objectives, deciding to eliminate mercury use in ASGM was an ambitious objective that set the bar high for action. Nevertheless, experience has shown that bans without alternatives to mercury technologies do not work well and can be counter-productive (UNEP, 2012b). While Mongolia has experienced success with the Bornuur non-mercury processing facility, there is still limited access for miners to non-mercury processing facilities and the establishment of a national federation of miners was a recommendation included in the case study. The target of no mercury remains a true challenge to implement and monitor, particularly because any miner using mercury is currently doing so illegally. At the same time more generally, it is recognized at the global level that more progress is often made on goals that have specific and measurable targets (UNEP, 2012d).

Priority action 2 - Eliminating worst practices in ASGM (whole-ore mercury amalgamation; open burning without mercury capture; and use of cyanide with mercury or after mercury use) and promoting awareness and adoption of cleaner ASGM practices and technologies

Two of the significant challenges faced by the sector that were identified in the interviews include: the limited capacity to address the issue as well as the social complexity of it. In addition, two of the recommendations made in the Mongolia case study directly relate to adopting cleaner practices. This action is the area where the actual mercury reductions occur and where the challenge of scaling up is faced, especially with limited resources. For this action, it could be strategic of the Partnership to focus on the major source countries, in particular when current available data in Table 2 shows that 93 % of the total estimated use of mercury comes from 20 source countries.

The Partnership is not positioned to track project level progress; it simply encourages partners to report on projects, suggesting some possible reporting metrics. In order to facilitate the learning and scale-up of activities required for this objective, future ASGM programming will need to build on lessons learned in CASM and the UNIDO Global Mercury Project, in particular to promote structure and rigour in project reporting, self-evaluation and monitoring processes and to make this information available to others.

In addition, the Partnership should encourage scale-up of activities through this objective. Suitable metrics that are already identified include production of awareness-raising and training materials, delivery of tools and models on technologies and formalization that will assist government and others to promote mercury reductions. The Partnership should also track opportunities for information exchange as an overall reporting metric that

promotes scale-up. Opportunities for information exchange could include large global conferences, regional workshops and web-based information sharing.

In terms of the proposed metrics for field projects, the Mongolia context shows, with a ban on mercury use, that the Partnership metrics need to include consideration for access to alternative technology, such as for example number of mercury-free processing points, number of miners with access to mercury-free processing or per cent of gold processed without mercury. In addition, Mongolia with a comparatively well-developed ASGM program could track addressing waste management.

Priority action 3 - Exploring innovative market-based approaches for sustainably mined artisanal gold

Limited information was drawn out of the study to support tracking progress for this Partnership priority action. However, experiences from the Mongolia case study demonstrate that countries would need to have some experience in addressing the ASGM issue before market-based approaches could be considered. For example, the case study recommended that Mongolia, having a well-developed program to address ASGM since 2005, work to develop a domestic market for gold in order for the gold to be sold within legal channels. In order for Mongolia to make progress in marketing gold generally, the domestic market for gold needs to be analysed, including how the buying policies and procedures of central banks apply to miners.

Moreover with a number of years of experience in addressing ASGM, Mongolia is well positioned to start addressing the issue of waste management. Addressing waste management would help to build capacity for miners to take part in certification schemes for gold, such as the *Fairtrade and Fairmined Standard for Gold from Artisanal and Small-Scale*

Mining, including Associated Precious Metals. In conclusion, based on the limited information gained in the study, some potential reporting metrics to support progress in this area in Mongolia might include (i) domestic market for gold evaluated; (ii) mercury-free gold refinery established; (iii) domestic market for gold is developed. Metrics for this area are likely to be country and situation specific.

Conclusions and Recommendations

The research undertaken for this thesis gathers and analyses information on options for measuring progress and offers some recommendations on appropriate measurement approaches to facilitate a sustainable global transition away from mercury in ASGM. The results of this study indicate a need for an overarching strategic framework approach to measure global progress towards mercury reductions in ASGM. A framework approach to evaluation can focus the selection of indicators and also assist with understanding how to make progress (Becker, 2005). Four guiding principles are recommended for the development of an overarching framework approach to measure global progress on reducing mercury use in ASGM practices: (i) the framework should, ultimately, consider progress in actions undertaken both by the Global Mercury Partnership and collective overall global actions given that there are significant amount of activities being undertaken outside of the Partnership; (ii) tracking progress requires review on multiple scales with multi-stakeholder input; (iii) in addition to tracking progress, the entity with responsibility for tracking progress should play a role in sharing evaluation information in order to promote scale-up of activities; and (iv) appropriate financing is required to measure global progress effectively.

Institutional capacity and organisation for administering an overarching framework approach to measure global progress is a key consideration for the practical implementation. While the future mercury treaty could foster a transition of miners to better or alternative practices, past experiences with global environmental agreements show that they tend to be weak on ensuring compliance at the local level (Sipple & Selin, 2012). The Global Mercury Partnership is currently the best available option for administering an overarching framework because it has an existing structure for operation and an identified network of contributing

experts in place to work with. However, many challenges currently exist in the Partnership's ability to actually track progress, foremost due to limited resources and lack of a large scale program. Another option could include requesting oversight by another body of experts identified through UNEP, the Partnership or the Conference of the Parties to the future mercury treaty. Alternatively, a more formalized and enhanced role for the Mercurywatch database and its network of contributing experts, building on the existing model of TRAFFIC and CITES as an example, could also be considered.

Four recommendations for an overall framework approach can be distilled from this research for efficiently promoting the demonstration of credible and continuous progress at the global level.

- *Recommendation 1: On-going and enhanced support to an information database, specific to ASGM, will be critical in providing reliable information to support decision-making and in making overall progress.*

In terms of tracking mercury use, the Mercurywatch database has emerged as the global platform for baseline mercury use information in ASGM that is informing the international community. Support for such a database and associated data collection efforts should be enhanced to serve the information needs of the international community, reduce the current high level of uncertainty in the available information and build capacity to track mercury reductions and progress globally. An independent platform generating such information based on a variety of sources is essential, particularly given that countries with mercury bans, as is the case in Mongolia, are likely to report mercury use data at zero in official channels through the Government.

The need for such a database will grow in the future as obligations to report on ASGM will exist under the future legally binding instrument on mercury, including the requirement for Parties to report on whether or not ASGM in their country is ‘more than insignificant’. While it is ambiguous at this stage what ‘more than insignificant’ means in operational terms, the Mercurywatch database is already playing a helpful role in identifying where there is significant mercury use globally. Therefore, it is believed that support for a global database of mercury use is also helpful for supporting the effective implementation of the future mercury Convention.

- *Recommendation 2: Moving towards reporting on some limited and simple metrics at the global level will help focus and guide an overall ASGM program.*

In Table 6, three reporting metrics are proposed for an overall ASGM program. These metrics are proposed because they are consistent with the challenges identified in the study, directly relevant to two of the three priority actions identified in the ASGM Partnership and believed to be within the current capacity of the Partnership to measure. While the metrics are not comprehensive, they should be viewed as a focused starting point for action and for overall evaluation of progress in the absence of any comprehensive global program.

Table 6

Proposed annual reporting metrics for the ASGM Partnership

Priority action	Proposed metric
1 - Supporting efforts of governments to set national objectives/reduction targets for ASGM	i) Number of governments with national objectives / national action plans / reduction targets.
2 - Eliminating worst practices in ASGM (whole-ore mercury amalgamation; open burning without mercury capture; and use of cyanide with mercury or after mercury use) and promoting awareness and adoption of cleaner ASGM practices and technologies	ii) Production of awareness-raising and training materials, delivery of tools and models on technologies and formalization that assist government and others to promote mercury reductions. iii) Number of opportunities for information exchange supported.
3 - Exploring innovative market-based approaches for sustainably mined artisanal gold.	No globally applicable metrics identified in the study.

- *Recommendation 3: Track national ‘phase of commitment’ on ASGM as an indicator in support of progress towards Government efforts to set national objectives and reduction targets.*

The number of governments with national objectives and reduction targets for ASGM is proposed as a metric for global progress in the previous recommendation. At the same time based on the Mongolia case study, it is believed that a deeper understanding of national ‘phase of commitment’ would be a helpful indicator to support change-making in a global ASGM program. The purpose of the ‘phase of commitment’ indicator would be to provide some common orientation and guidance to Governments working towards improvements in their ASGM sectors.

Table 5 in the discussion section proposes phases in national action plan development for ASGM, based on experiences with the Stockholm Convention on POPs and on the proposed text for the future mercury treaty. These proposed development phases could be

used as indicators of the ‘phase of commitment’ in strengthening ASGM governance at the national level and may also promote national government ownership of the issue.

Furthermore, tracking and communicating national ‘phase of commitment’ in an overall global ASGM program would promote an overall understanding of the status of governance issues in a more structured way for the international community, ultimately helping to set priorities at the global level.

- *Recommendation 4: Promoting a common set of project reporting metrics across global programming will be helpful in tracking and understanding overall progress and effectiveness of ASGM interventions.*

The ASGM Partnership Area currently incorporates a number of suggested metrics for tracking project level progress within its business plan. The Mongolia context shows that, with a ban on mercury use, metrics to include consideration for access to alternative technology are essential. Such metrics might include, for example, number of mercury-free processing points, number of miners with access to mercury-free processing or per cent of gold processed without mercury. The case of Mongolia also demonstrates that the metrics could be expanded to incorporate more sophisticated metrics over time. Such metrics, such as those related to tailings management, may only be applicable or achievable when initial enabling conditions are in place. Project reporting metrics may be further adapted in the future to align with relevant national ‘phase of commitment’. As a result of the findings in the Mongolia case study, four new project reporting metrics are proposed in Table 7. At the same time, it is likely that many others metrics could be identified for other countries facing different types of ASGM challenges.

Table 7

Metrics for ASGM project reporting under the UNEP Global Mercury Partnership

On a field project level, the Partnership encourages implementing Partners to report measureable field project results, such as:

- Number of miners (or other target recipients) trained.
 - Production of awareness raising materials/ training materials.
 - Successful completion of demonstration of alternative technology.
 - Where possible, typical number of kilograms of gold produced by ASGM for one kilogram of mercury used and/or typical emissions reductions achieved.
 - Typical amount of mercury purchased, used and traded by ASGM miners before and after intervention.
 - Availability of environmental quality data in relevant areas.
-

Proposed additional metrics based on the Mongolia case study:

- Number of mercury-free processing points.
 - Number of miners with access to mercury-free processing.
 - Per cent of gold processed without mercury.
 - Tailing management measures in place.
-

At present, project reporting is not actively promoted by the Partnership as it does not have the capacity to review overall progress. Nonetheless to promote understanding and scale-up of mercury reduction activities at the global level, the Partnership should proactively promote project reporting and provide more tools in this area for project implementers.

Tools might include a project self-evaluation template and additional evaluation tools in the *Guidance document: Developing a national strategic plan to reduce mercury use in artisanal and small-scale gold mining*. The promotion of project reporting could start with Partnership activities, but in order to track collective progress in reducing mercury use globally, it will be important to consider progress in significant programs that are not Partnership actions, including for example the SAM project in Mongolia. Ultimately, a global database of

projects and associated evaluation of them could be of tremendous value in international efforts to reduce mercury use in ASGM.

In closing, this research could benefit from including other national level case studies and from additional analysis of other applicable progress measurement approaches to broaden the overall reflection. In addition, the study considered progress measurement as it relates to the current Partnership objective and priority actions which provided a framework for the discussion but may have limited the context of the analysis. Future studies could consider the appropriateness of the identified objective and priority actions in achieving the intended results. Nevertheless, this research has contributed to a much needed discussion and analysis in support of sustainable mercury reductions in ASGM at the global level, proposing insightful guiding principles and recommendations for an overarching framework approach to measuring progress.

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