Title: Mercury Watch Portal:
Charting the Improvement of Artisanal and Small-Scale Gold Mining

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Abstract:
The project "MercuryWatch: Charting the Improvement of Artisanal Gold Mining" aims to provide up-to-date, reliable information regarding ASGM distribution, practices, socio-economics, and mercury use. This information was used in developing the recent Minamata Convention on Mercury, to which 96 countries have signed and 1 country ratified (the USA). The research that this IDRC grant has supported has been, and remains central to one of the most significant issues in the Minamata Convention, namely mercury releases from artisanal and small scale gold mining (ASGM). Emissions from ASGM are now recognized as the single largest source of anthropogenic mercury to the environment surpassing coal. Together with support from the IDRC, the Arctic Monitoring and Assessment Program (AMAP), and most recently the Natural Resources Defense Council (NRDC), the AGC has been able to increase awareness of the problems and solutions surrounding the ASGM sector, improve the amount of quality information available while increasing the capacity of different actors for collecting information, and produce an updated MercuryWatch website and database to house such information.

Keywords: mercury, gold, artisanal mining, mercury watch, Minimata Convention
Summary:

The project "MercuryWatch: Charting the Improvement of Artisanal Gold Mining" is aimed to provide up-to-date, reliable information regarding ASGM distribution, practices, socio-economics, and mercury use. This information was used in developing the recent Minamata Convention on Mercury, to which 96 countries have signed and 1 country ratified (the USA). The research that this IDRC grant has supported has been, and remains central to one of the most significant issues in the Minamata Convention, namely mercury releases from artisanal and small scale gold mining (ASGM). Emissions from ASGM are now recognized as the single largest source of anthropogenic mercury to the environment surpassing coal. Together with support from the IDRC, the Arctic Monitoring and Assessment Program (AMAP), and most recently the Natural Resources Defense Council (NRDC), the AGC has been able to increase awareness of the problems and solutions surrounding the ASGM sector, improve the amount of quality information available while increasing the capacity of different actors for collecting information, and produce an updated MercuryWatch website and database to house such information.

The new website, to be launched within months, will display and map estimates of mercury use in ASGM as well as numbers of miners, types of practices, and other important information that is relevant to researchers and policy makers. In addition to the technical improvements to the website, improved data on ASGM and mercury use has been collected by the AGC and its partners in Nicaragua, Burkina Faso, Senegal, and the Ivory Coast. While collecting information in these countries, partnerships and relationships have been developed and strengthened and various capacity building and awareness raising activities have been carried out. Specifically, mercury inventory methodology and National Action Plan training programs were carried out in the Ivory Coast and Burkina Faso, and at the United Nations Environment Programme’s Global and Andean Forums on ASGM in Lima, Peru and Medellin, Columbia. Additionally, in Bolivia,
Nicaragua, and Senegal awareness raising and better practices training (including mercury reduction activities) were implemented, and in Burkina Faso the first ever mercury-free processing system and training centre was established.

The activities surrounding the development and ongoing maintenance of MercuryWatch has and continues to increase awareness around the topic of ASGM, mercury releases, and the connection to international development and the Minamata Convention. Activities over this grant have effectively led to greater capacities for inventory methodology, increased awareness, and the development of projects that will reduce the use of mercury in ASGM around the world and improve the ASGM sector and its communities.

**Research Problem:**
The main problem that the MercuryWatch Portal project is meant to address is the lack of a global strategy, knowledge base, or clearing house for the growing issue of ASGM, its releases of mercury, and its need to formalize and enter the formal economy. The lack of information to feed such needed strategies has been a significant barrier to their formulation. The MercuryWatch.org database and website is designed to inform global, national, and local policy and research on ASGM and mercury. With the agreement on the text of the Minamata Convention and also with the latest recognition by the international scientific community that ASGM is now the world’s primary source of anthropogenic emissions of mercury, largely through the work of the Artisanal Gold Council, the need for this database has become ever more evident.

Activities over the project period have provided the AGC with important insight into the problems surrounding information gathering of ASGM distribution and mercury use. Specifically, the various complexities involved in the investigation of informal ASGM communities has made apparent the difficulty in capacity building and the sharing of methodological approaches towards the subject. How to enable governments, civil society groups, or other stakeholders to collect robust and reliable data on ASGM has proved challenging. This is a key component to the ongoing sustainability of MercuryWatch, as it relies on a consistent flow of updated information from some 70 countries in the developing world. This project has therefore taken important steps to develop inventory methodologies and train governments and practitioners in inventory implementation.

**Objectives:**
The overall objective of the project is the chart the reduction of mercury use and improvement of artisanal and small scale gold mining, and in doing so contribute to the development and formalization of the ASGM sector in the developing world. This project has significantly contributed to this objective in that it has increased awareness of the problems related to mercury use and ASGM through the MercuryWatch portal and related activities, and has facilitated specific research and training exercises in several countries related to carrying out ASGM mercury inventories.

The specific objectives of the project are as follows:
1.1 To streamline and improve the current version of the MercuryWatch database and website, integrating data gathered through field research carried out by the AGC in Africa, South America and Asia.

*The new version of MercuryWatch has been completed and updated with new information integrated from field studies by the AGC and its partners.*

1.2 To raise awareness and share knowledge about ASGM, including the problems surrounding it, the solutions available, and the development opportunities that it represents.

*Awareness raising and knowledge sharing regarding ASGM has been carried out in several forums including UNEP’s Global and Andean Forums on ASGM and through the OECD’s Due Diligence ASM Hub and on several platforms in addition to MercuryWatch itself including the AGC’s website, project partners websites, and international media.*

1.3 To support the formalization of the ASGM sector through the dissemination of the relevant information that supports policy alternatives and innovative approaches for governments and stakeholders.

*Formalization of the ASGM sector has been supported through policy recommendations and projects related to National Action Plans under the Minamata Convention.*

1.4 To enable researchers, policy-makers, the private sector, and civil society to reference valid, up-to-date information in order to make informed policy decisions and to create awareness amongst stakeholders.

*This objective is ongoing and although the information that currently exists on MercuryWatch is helpful to governments and other stakeholders in developing plans and policies, increased efforts and resources need to be allocated to carrying out more in-depth research on country-specific ASGM sectors.*

1.5 To facilitate the sharing of experiences and knowledge of the ASGM sector from one country to another and between the developing and developed worlds. This includes the training of local partners on various methodological approaches to data gathering that have proved effective in different regions; and

*This objective has been complete and continues to develop. Local partners have been formally trained in Burkina Faso, Senegal, and the Ivory Coast on ASGM mercury inventories, and governments and other stakeholders have received training at the Global and Andean Forums on ASGM organized by UNEP.*

1.6 To chart improvements by monitoring changes from year to year and providing reports on these changes.

*Developing a reliable monitoring mechanism for mercury use in ASGM has proved one of the most challenging objectives of this project. To this end however, the AGC has implemented several initiatives that it believes could form the basis of a reliable monitoring system in specific countries. In Burkina Faso for example, the AGC is working in collaboration with the Syndicat des Orpailleurs who are represented across the country in order to carry out a nation-wide inventory and monitoring system. Development of this aspect of MercuryWatch will be the priority of this project over the coming years.*
Research Findings:

Research carried out by the Artisanal Gold Council with assistance and contributions from the Arctic Monitoring and Assessment Programme (AMAP) and the Natural Resources Defence Council (NRDC) has led to new global estimates for mercury emissions in ASGM, which is now considered to be the leading source of anthropogenic mercury emissions. Annual emissions from ASGM are now estimated at 727 tonnes, or 37% of total anthropogenic emissions.

It has been concluded that the large increase (approximately 400 tonnes/year) from the 2005 estimate for mercury emissions from ASGM has been mainly the result of improved reporting (although increased ASGM activity is also a likely contributor). The most obvious example of this is in West Africa – where the Artisanal Gold Council has provided various new estimates. The previous 2005 global assessment included only a presence absence indicator of ASGM and mercury use in West African countries and each were assigned a minimal value of 0.3 tonnes/year. It is now estimated that in Burkina Faso and Senegal, 35 and 11 tonnes of mercury are used annually. And that is in just two of the 16 ECOWAS countries, many of which have ASGM.

Research throughout this project has resulted in new estimates of mercury use for several countries where the AGC and its partners have carried out field work. In the interim reporting period, the AGC presented new ASGM mercury estimates based on primary research (field measurements, mass balance,
interviews, and triangulation) that included the following: Bolivia, 120 tonnes; Nicaragua, 15 tonnes; Burkina Faso, 35 tonnes; Senegal, 11 tonnes. Other secondary source data provided, in the best case, improved minimum estimates, and at least, the known presence of ASGM and mercury use. These countries include: The Ivory Coast, Honduras, Benin, Burundi, Ethiopia, Cameroon, and the Central African Republic. Throughout the second half of the project period new information has resulted in updated estimates from Nicaragua, now putting the ASGM mercury use estimate at 50 tonnes/year.

Our research has also led to the development of new methodologies and training curriculum for ASGM mercury inventories. Field work on mine sites has allowed the AGC to refine methodologies, and the development of a “Practical Guide on ASGM Inventories” is currently in production, funded by the United States Department of State. Additionally new methodologies have been shared with governments at the United Nations Environment Programmes Second Global Forum on ASGM, as well as to various local experts in West Africa. Such training importantly contributes to the design and implementation of National Action Plans as required by the Minimata Convention.

Activities:
Activities supported under this project have been carried out as planned, and have served to complement ongoing AGC activities in both Canada and in the field. The main activity supported throughout this project has been the updating and improvement of the MercuryWatch website. The budgeted amount of ($10,000) for consultants for the project has been used on website programing and design, which has resulted in a completely new MercuryWatch interface as illustrated below.

In addition to the technical work on the MercuryWatch website, international training activities on ASGM mercury inventories and ASGM mercury research have been partially supported by this grant as a cost-share with other AGC activities (as agreed upon in the approved budget). Extensive field research in Burkina Faso, Senegal, Nicaragua and the Ivory Coast has been conducted, with travel and research expenses supplemented by this grant ($15,571). As mentioned above, this research has contributed to populating the new MercuryWatch portal while at the same time helping to refine mercury inventory methodologies while building capacity for ASGM mercury inventories in the developing world. To this end several workshops and training activities have been carried out which are described below utilizing the remainder of the grant's budget ($3000).

Project Outputs and Dissemination:
Based on the relevance of this project to other ongoing AGC activities, and the importance of MercuryWatch to global efforts surrounding ASGM and mercury reduction, the project outputs to date have been numerous. The principle output, directly funded by IDRC and with more recent support from the Natural Resources Defence Council, has been the updating, reprogramming, and redesign of the MercuryWatch website (Figure 2). This has included the modernization of the system for managing this system, with the establishment of a dedicated MercuryWatch server, an administration website, and a test website. The programming of MercuryWatch is more than just a website. The MercuryWatch server and portal contains some high level code that automatically collects data from the internet to continuously build the MercuryWatch database. For example demographic data such as country population, life expectancy at birth, the price of gold, and the price of mercury are automatically collected and available to produce on-line reports instantly. MercuryWatch performs statistical
algorithms to group the different types of data from the MercuryWatch Database and use these groupings to produce maps such as the home page as well as derivative maps like “mercury use/population” for immediate and effective visualization – no external software is needed, just a browser. Further refinement of the new website will be carried out before it is officially launched, projected for March 2014.

Figure 2: New MercuryWatch Website including a cleaner homepage, an about section, a gallery, and a login for registration.
Other outputs include the publication of the UNEP 2013 Global Mercury Assessment (GMA) and the Technical Background Report for the 2013 Global Mercury Assessment <http://www.unep.org/hazardoussubstances/Mercury/Informationmaterials/ReportsandPublications/tabid/3593/Default.aspx>. Dr. Telmer and the Artisanal Gold Council are authors of Chapter 2: Global Emissions of Mercury to the Atmosphere; and a Contributor to Chapter 4: Global Releases of Mercury to Aquatic Environments. The covers of these two publications are shown below in Figure 3:

Training local country personnel has included the development and refinement of mercury inventory methodologies, with AGC field work together with local partners providing new updated ASGM mercury estimates for Burkina Faso, Senegal, and Nicaragua.

The AGC has strived to build capacity among our partners in the developing world, particularly among the artisanal and small-scale miners themselves. To this end we have carried out the following:
• Extensive training of a researcher in Burkina Faso, based out of the University of Bobo Dioulasso, on ASGM mercury inventory methodologies and supply chain mapping. Over the reporting period this researcher has conducted inventories of more than 25 ASGM sites in Burkina Faso and has provided evidence of the use of mercury in the Ivory Coast. This researcher has carried out an internship with the AGC over the second reporting period during which time he focused his thesis on ASGM.

• Delivery of “A Practical Guide: Reducing Mercury Use in Artisanal and Small-Scale Gold Mining” in the communities of Tomboronkoto, Senegal; Bantaco, Senegal (Error! Reference source not found.4); Gombeledougou, Burkina Faso; and Hiré, Ivory Coast. During these outreach trips to ASGM communities, technical alternatives to mercury were described and where feasible, demonstrated.

• Development of ASGM mercury inventory and health awareness training curriculum for researchers and policy makers, with the aim of supporting countries in meeting the obligations for ASGM, including the creation of a National Action Plan on ASGM, under the Minamata Convention. This curriculum, which was put into practice by the AGC in the Ivory Coast in May 2013 (Error! Reference source not found.), is aimed at reaching a wider audience including academic researchers, civil society groups, and governments who require important ASGM data in order to develop sound policy towards the sector, particularly in light of the requirements of the Minamata Convention.

• In-depth 2 day ASGM mercury inventory train the trainer session provided to the Syndicat des Orpailleurs in Burkina Faso in February 2014. The Syndicat is a national body that represents more than 9000 miners across the country in all mining areas. This training has allowed for an innovative monitoring and feedback mechanism for ASGM mercury use in the country. A national inventory will be conducted in the Spring of 2014 by the Syndicat based on this training.

• Development of a “Practical Guide on ASGM Inventories” underway through funding by the United States Department of State. This will include two versions of the guide, one for governments and practitioners, and a more participatory self-reporting guide designed for use by miners themselves.
ASGM inventory development training to governments at the United Nations Environment Programme’s Second Global Forum on ASGM, in Lima, Peru in September of 2013 and UNEP’s Andean Forum on ASGM in November, 2013. These training sessions included an innovative “breakout” training exercise that allowed government officials to participate in an informational triangulation exercise, helping them to understand the complexity of carrying out an inventory in ASGM. See below (Figure 4) for an example of the type of exercise provided.

**Outcomes:**

The outcomes of this research have been far reaching, including changes in the conditions in marginalized ASGM communities, but also of government and international policy towards the sector. The recognition of ASGM as the largest anthropogenic source of mercury emissions and releases to the environment globally has resulted in increased attention to the sector and a focus on finding solutions in support of ASGM communities. Continuously updated estimates and the access to such estimates via the MercuryWatch portal have supported the development of the Minamata Convention and associated National Action Plans on ASGM. Importantly, advances on the MercuryWatch portal position it as a potential official monitoring tool and database for the ASGM components of the Minamata Convention (Article 7, Annex C).

The work of the AGC related to this research has resulted in the development of a wide network of actors and collaborators focused on finding solutions for the ASGM sector. Organizations such as the OECD, the World Bank, and several national development agencies among others have all taken steps to address mercury use in the ASGM sector through formalization and technical improvement projects.
Particularly important has been the development of mercury reduction and mercury elimination technical projects in various countries around the world. Throughout the life of this project the AGC has designed and installed a mercury free processing plant in Burkina Faso, and will be doing so in Senegal, the DRC, Nicaragua, and Columbia in 2014-2015, contributing to improved environments and health for thousands of ASGM communities.

Importantly, this research has directly contributed to the development and refinement of new and innovative methodologies for implementing ASGM mercury inventories and for the continued monitoring of the sector. Knowledge sharing and capacity building remain a key challenge in the building of national inventories on ASGM, and the AGC has been developing clear, cost-effective and reliable ways to build knowledge and capacity, and to retrieve data from the informal ASGM sector.

Assessment and Recommendations:

The project “MercuryWatch Portal: Charting the Improvement of Artisanal and Small-Scale Gold Mining”, has contributed to improving global awareness and recognition of the importance of ASGM in the developing world. This IDRC grant has enabled a much-needed improvement and reprogramming of the MercuryWatch website, as well as supported important ASGM mercury related research and capacity building in the developing world, however much work remains and continued funding for this project is necessary. The new MercuryWatch website will be launched within the coming months, and its ongoing maintenance and improvement (particularly with regards to data) will be vital. Knowledge and awareness on ASGM is critical in developing sound policy that affects the lives of millions of people associated with ASGM. However, MercuryWatch needs further improvements and a sustainability plan. Building on the developments and accomplishments of this grant, an important next step will be the continued development of monitoring and reporting tools for ASGM, and on the continued improvement of methodologies for engaging and understanding the informal sector.