



# ASM 2009 MOZAMBIQUE



## Background Papers

### 9th Annual CASM Conference

September 8-14, 2009 / Maputo-Chimoio, Mozambique

«ASM: An Opportunity for Rural Development»



República de Moçambique  
Ministério dos Recursos Minerais



THE WORLD BANK GROUP



*The views expressed in this publication are those of the individual authors and do not necessarily reflect the official policies of the sponsors.*



ASM 2009  
MOZAMBIQUE



# Background Papers

## 9th Annual CASM Conference

September 8-14, 2009 / Maputo-Chimoio, Mozambique

«ASM: An Opportunity for Rural Development»



República de Moçambique  
Ministério dos Recursos Minerais



THE WORLD BANK GROUP





# Table of Contents

<b>Microfinance in Artisanal and Small-scale Mining</b>	<b>1</b>
Abstract	1
Artisanal and small-scale mining and the need for financial services	1
The microfinance spectrum: microcredit, microdebt and microsavings	1
Examples of ASM finance programs	2
Key challenges in extending credit to ASM	2
Informal credit and debt cycles	3
Advantages and disadvantages of two possible mechanisms	3
Case study: Ituri, DRC	5
Conclusions	7
References	7
Endnotes	8
Dedication	8
<b>Mercury Use in Artisanal and Small-scale Gold Mining (ASGM)</b>	<b>9</b>
Mercury in ASGM	9
What low-mercury and mercury-free techniques are available for artisanal and small scale gold mining?	10
Social aspects of mercury use	11
Endnotes	11
<b>The ASM in Mozambique: Experiences, Challenges, and Opportunities for Rural Development</b>	<b>13</b>
Abstract	13
Background and nature of ASM in Mozambique	13
Social, economic, and environmental issues/challenges	14
Contribution of ASM in Poverty Alleviation	17
References	18
Endnotes	18
<b>Climate Change and ASM: The Facts and Implications<sup>1</sup></b>	<b>19</b>
Introduction	19
An overview of climate change	19
Key facts <sup>12</sup>	20
Conclusions	22
Stakeholder responses and policy directions	23
References	25
Endnotes	25
<b>Connecting ASM Mines to Markets</b>	<b>27</b>
Abstract	27
Introduction	28
Why ASM mines are currently far removed from the market	28
Drivers for stronger ASM mine to market linkages	29
How the drivers are manifest as market trends	30
What this means for ASM	32
Looking forward	33
What next?	35
Endnotes	36

<b>Responsible Business Approaches towards Artisanal and Small-Scale Mining: Ensuring Lessons from the Boom for the Time after the Bust</b>	<b>37</b>
Introduction	37
The boom	37
Responsible business approaches to ASM during the boom	40
The bust	43
Conclusions	47
Endnotes	50
<b>Certification and Artisanal and Small-Scale Mining</b>	<b>53</b>
Endnotes	54

# Microfinance in Artisanal and Small-scale Mining

Karen Hayes, Director of Corporate Community Engagement, Africa Region, Pact Inc., Nairobi, Kenya

Veerle Van Wauwe, Founding Director, Transparence S.A., Geneva, Switzerland

## Abstract

This paper explores the opportunities and challenges to be overcome in the provision of microfinance services to the artisanal and small-scale mining (ASM) community. Microfinance can be a significant enabler for informal micro-entrepreneurs to enter the formal economy, gain access to property, obtain concession rights, adopt technological innovation and embark on human and economic development for themselves and their families. However, in our research we found only a limited number of examples of the extension of microfinance services to ASM. Among those, few were successful, and many focused solely on microcredit. Pact's successful 'WORTH' program for women's empowerment (already reaching 200,000 women in eight countries) is now being applied to ASM communities in the DRC. Early lessons point to the positive impact of introducing microsavings programs accompanied by literacy training. Empowerment is a vital driver of sustainable change and the immediate benefit of access to financial services has subsequent positive economic impacts that allow artisanal miners to better manage their finances, address debt, improve the efficiency and productivity of their mining activities, and develop alternative or supplementary livelihoods. To achieve these outcomes, microfinance must not be a standalone offering. There is a need for collaboration with partners providing other services such as literacy, capacity building, and the creation of a viable environment for business. This paper discusses how, depending on the needs of the artisanal miners and the stage of development of the mining communities, different microfinance solutions are appropriate. Microsavings programs are not the only option, but they may be an essential precursor to ensure the success of other services.

## Artisanal and small-scale mining and the need for financial services

ASM is an expensive business. Before generating any revenue, artisanal miners purchase equipment for mining or processing, food and other subsistence goods consumed while waiting to find and sell minerals. They pay fees to work in mines, and taxes to formal and informal agents who control mining, transport and trading areas. The demand for sources of finance to cover these costs, as well financing to scale-up or diversification operations is regularly voiced by artisanal miners in consultation processes. The need to create sources of finance for ASM, often through microfinance programs, is regularly given as a recommendation in reports by consultants, NGOs and other experts. However, the ASM community continues to be underserved by the formal financial industry and not-for-profit financial institutions.

In the following pages we present several examples of programs implemented in the past to address the finance needs of artisanal miners. We briefly discuss some of the challenges faced by those programs, and we compare and contrast Self-help Microfinance Groups (SHMG) with larger microfinance institutions (MFI). Finally, we examine in more depth the early stages of a savings-led approach to finance for artisanal miners in the Democratic Republic of the Congo and present lessons learned from this case.

## The microfinance spectrum: microcredit, microdebt and microsavings

Microfinance is defined as the supply of financial services to microenterprises and poor families (Mersland & Eggen, 2007). Microcredit is normally a short-term, high-priced (interest rate) loan for working capital to the self-employed poor. The main reason for the high interest rate is because of the high cost of handling many small loans (Mersland & Eggen, 2007). For those without repayment capacity, contracting microcredit can be a very risky strategy and it has been suggested that it should be re-named "microdebt" (Hulme, 2000).

An often neglected component of microfinance is microsavings. The Grameen Bank and Foundation consider that expanding access to safe savings is an over-riding priority and that even for the very poorest, those who may not be appropriate recipients of microfinance services, savings may be a key tool to enable access to financial services and to alleviate poverty (Counts & Meriwether, 2008).

At this point, it is useful to define three types of microfinance mechanisms (Mersland & Eggen, 2007):

- ▶ **ROSCA:** Rotating Savings and Credit Association (ROSCAs) are traditional self-help groups where the members pool their savings and redistribute it as loans or gifts between the members. It is a self-help group owned and initiated by around 10 to 30 members. No donor money or technical assistance from outsiders is involved.
- ▶ **SHMG:** Self Help Microfinance Groups (SHMGs) are similar to ROSCAs, but with one main difference. A SHMG is promoted, initiated, assisted or supported by donors or other outsiders. Thus, a SHMG can often be more sophisticated and take on a broader scope of work. SHMGs are also known as Savings and Credit Groups (SCGs) and Village Savings and Loan Associations (VSLAs)
- ▶ **MFI:** Micro Finance Institutions (MFIs) are formal providers of microfinance services. MFIs can be organized as banks, cooperatives or NGOs. MFIs can provide more sophisticated financial services compared to ROSCAs and SHMGs, and normally serve thousands of clients. They are operated by a professional paid staff.

### **Examples of ASM finance programs**

Various studies have proposed different types of financial services which may be helpful to ASM. The World Bank has suggested that mutual guarantee funds and special financing cooperatives can help reduce transaction costs and improve access to credit for ASM workers (Barry, 1996). The Global Mercury Project in Zimbabwe identified local programs that offered microcredit and, based on these findings, recommended that the Zimbabwean Government develop special loan guarantee and flexible payment schemes for ASM similar to financing programs available to the nation's

small farmers (Chouinard & Veiga, 2008). The Zimbabwe Ministry of Mines extended loans to some women miners amounting collectively to over 50 billion Zimbabwe dollars in 2007, but miners confirmed that the loans were poorly disseminated, with severe delays in disbursement, causing the actual value of such assistance to be miniscule (Spiegel, 2009).

A \$10m credit from the World Bank is to be disbursed to ASM communities in Nigeria. The fund is designed to finance equipment, training and promoting access to finance and product markets. A minimum of ten miners must form a cooperative society to access the fund, and \$50,000 about (N6m) is the maximum value any group can get. The credit will not be in cash but rather will pay for services and purchases and must be matched by the cooperative (MMSD, 2008).

In Sierra Leone, a revolving loan fund of \$522,000 was planned by USAID to provide microfinance for miners' cooperatives. Each loan was supposed to be an operational overdraft, provided on the basis of a business plan. However, in the end, compliance with regulations proved to be burdensome and the process was prolonged. In the end, it was concluded that the credit scheme would be unworkable and the donor withdrew. The fund was replaced with a direct financing scheme which was similar to the supporter system, and was limited in its impact and success (Levin & Turay, 2008).

A project funded by the Japan Social Development Fund (JSDF) and implemented by the Wau Ecology Institute (WEI) to assist ASM communities in Papua New Guinea included business and microfinance skills. As a result of this, more than 25% of participants opened new accounts with the Wau Micro-Bank (Moretti, 2007).

Still, considering the demand for microfinance in ASM communities, few programs have been appropriately designed with ASM communities in mind, and even fewer have been successfully implemented or had their results measured.

### **Key challenges in extending credit to ASM**

Lessons from various ASM finance programs demonstrate certain challenges to the extension of loan financing to ASM by traditional financial institutions. Artisanal miners may be considered



not credit-worthy for several reasons: migratory lifestyles, lack of land tenure, marginal legal status, and the social challenges associated with artisanal mining, along with poor (if any) financial and business planning skills. Mining areas may be remote, the mines may have a limited lifespan, and the sites often fall outside areas targeted by development programs. ASM is generally carried out with little access to geological assessment skills with which to identify or confirm the scale or value of the resource. Therefore, there are typically few guarantees of return on investment. Any combination of these factors can contribute to a perceived or actual challenge in making repayments. Because credit-worthiness is an essential pre-requisite for any loan to be made or for other financial services to be accessed, artisanal miners rarely make it through the screening process. Coupled with this, artisanal miners are frequently insufficiently organized or prepared to qualify for financing on a scale attractive to traditional financial institutions.

In the absence of traditional credit sources, the next obvious option would be credit through microfinance institutions. However, as with traditional financial institutions, the pool of microfinance providers is often restricted in ASM areas and the reality is that most miners requiring loans seek funds from creditors connected to the ASM community.

### **Informal credit and debt cycles**

The creditors to whom ASM workers regularly turn may be mine owners, mineral traders, commercial goods traders, or others. Depending on the nature of the relationship, the creditor may charge interest on the loan or may request or require preferential purchase options and prices. The level of debt which is incurred, and how it is serviced, varies widely across ASM communities.

For example, in some mines in the Siguiro region of Guinea, debt lasts only for a day. The miner borrows what they need and, at the end of the day, they give half of what they have found to the creditor, regardless of the amount of minerals found. The following day, the slate is wiped clean and the borrower has no debt. This system has evolved in Siguiro's Muslim ASM communities based on Islamic interdictions against the collection of interest.<sup>1</sup>

In contrast, a 2008 study of Ghanaian ASM camps revealed that some miners owed thousands of dollars in expenses to their creditors and were consequently trapped in ASM (Banchirigah, 2008). Also, in the copper and gold mines of the Democratic Republic of Congo (DRC), debts can become binding obligations and may result in high degrees of control by the creditor over the miner. In some cases, miners are moved from site to site at the instruction of the creditor, effectively becoming indentured laborers. This can impact on a miner's family when children are expected to service the debt of their parents. In interviews, many Congolese artisanal miners cite debt as their biggest barrier to exit from ASM.

The demand for, and supply of, credit creates a complex relationship between the miner and the creditor. ASM creditors fulfill other important functions in the ASM community beyond just supporting the costs of doing business. They can be an important source of "no-questions-asked" assistance for urgent financial needs, assistance with health costs, import of commercial goods, and other important services which are not provided by any other source. In a review of an intervention in Sierra Leone which was designed to create ASM co-operatives and new, external sources of finance, miners expressed an unwillingness to participate because they were reluctant to abandon or jeopardize their relationships with supporters because, beyond credit, these patrons provided social security in the form of occasional but critical financial and political assistance in times of trouble (Levin & Touray, 2008). Hence the provision of credit is not a stand-alone function and simply replacing the credit line with a different one from an external source may be an inappropriate and incomplete response to the need.

### **Advantages and disadvantages of two possible mechanisms**

Microfinance can provide the opportunity to informal miners to break the vicious circle of operating solely in economic survival mode. It can have the dual impact of 1) empowerment and financial flow stabilization with 2) a concurrent increase in purchasing power and the build-up of capital. Ideally, microfinance can contribute to the liberation of indentured laborers. However, Churchill and Guerin make the prudent observation that "Microfinance

alone will not solve debt bondage. The first point about microfinance for the poorest is that it must be combined with complementary non-financial services to achieve sustainable poverty reduction". Furthermore, microfinance has the potential to increase ASM workers' ability to purchase licenses and equipment and it can empower those who wish to leave the ASM system, or at least wish to diversify their livelihood options.

So what is the most appropriate microfinance service for ASM? What delivery mechanism is likely to be most effective? Analysis of the comparative advantages and disadvantages of the two key mechanisms has been carried out in several microfinance reports (Mersland & Eggen, 2007) and these factors are seen in the box below through an ASM lens.

These factors of reach, cost, flexibility, time, relationships, and scale all need to be considered in planning any ASM finance program. There are also other critical dynamics to explore. Typically,

if microfinance institutions exist in an ASM area, they are likely to provide credit as their key, if not their only, financial function and many reports automatically recommend microcredit without presentation of the alternatives. The assumption that miners will necessarily benefit from access to microcredit may be flawed. If an artisanal miner has poor capacity for control and prudent management of their finances, access to credit could exacerbate rather than alleviate their difficulties. For miners who are indebted, more credit may just compound their problems. The use of microcredit to try to address existing debt issues (for example, debt to a trader or mine owner) is equally risky. Through microcredit, the dependent relationship merely switches from the employer to the microfinance institution and the worker remains vulnerable to the next employer or middleman who appears to be offering a better deal (Churchill & Guerin, 2004).

There are also arguments against a savings-led strategy, one typical example being "if

<b>Advantages of SHMGs compared to MFIs for ASM</b>	<b>Disadvantages in SHMGs compared to MFIs for ASM</b>
<p>SHMGs are better able to reach poorer population segments living in less densely populated areas than are MFIs which suits the profile of many ASM areas.</p> <ul style="list-style-type: none"> <li>▶ The cost per member for establishing SHMGs is usually low while the cost of establishing MFIs is high. ASM project funds are usually limited and the project life may be short. Therefore, cost-effective interventions are needed.</li> <li>▶ SHMGs recycle local savings and don't drain resources from the community, whereas most MFIs do not provide any savings services. ASM communities need mechanisms to capture more of the value of the materials they produce and trade.</li> <li>▶ SHMGs have the opportunity to bring along several non-financial benefits whereas MFIs are specialized institutions providing their clients with financial services only. SHMGs give their members the opportunity to meet, learn from each other, and provide a possible arena for generating positive social capital. There are a range of social goods which can be generated for ASM communities through such forums including training, information dissemination, local level legal awareness and enforcement. SHMGs generally offer only very basic savings and credit services and savings can only be withdrawn occasionally which may not suit migratory ASM workers.</li> </ul>	<ul style="list-style-type: none"> <li>▶ The migratory nature of some artisanal miners may be a challenge to creating the essential group trust for an SHMG.</li> <li>▶ It takes time to generate a loan-pool and, even when it is up and running, the loans that can be made are generally small and short-term. For those who need larger, longer-term loans for activities such as investing in ASM equipment and licenses, an MFI may be more suitable.</li> <li>▶ SHMGs are fragile structures. Quarrels between members, misunderstandings in money management and fraud are common. ASM communities can be prone to internal disputes which negatively impact the effectiveness of the savings group. MFIs are generally more robust structures and tend to survive over time.</li> <li>▶ SHMGs are normally formed based on the principle of self selection of members so the most vulnerable and stigmatized can be excluded. This could lead to conflict in an ASM setting, while issues like these may be more easily addressed in an MFI.</li> <li>▶ Participation in SHMGs is time-consuming and ASM workers are often already working long, hard hours. The use of an MFI does not entail the same obligation.</li> </ul>

they do not have sufficient funds to pay for their daily needs, how they can possibly save money?" (Churchill & Guerin, 2004). Yet from an ASM perspective this is another positive point for SHMGs. In a productive mine, the ASM community members typically have money. The challenges are more around lifestyle and management issues whereby money is spent quickly on expensive consumables along with servicing of debts, and inflated cost of living in mining areas. In Madagascar, earnings from ASM are considered "vola mafana" or "hot money" which is spent quickly and frivolously (Walsh, 2003). Individuals may not have a great deal of it, and there may be many demands on their income, but they typically do handle cash on a regular basis. There is little or no culture of saving. As observed by Cartier (2009): *"Miners earn money but, in many cases, have no opportunity to send this home as remittance or save the money in other form. Failing to find practical solutions to this problem will further compete against making (ASM) sustainable."*

Research indicates that the lasting beneficial social development effects of microcredit may partially depend on simultaneous facilitation of microsavings (Ahlin & Jiang, 2005). Thus, for miners at the purely artisanal end of the scale who operate on a hand-to-mouth basis, in order to successfully introduce microfinance services, it is important that a culture of savings is introduced through SHMG-type savings programs.

### Case study: Ituri, DRC

In the northern Ituri District of the Democratic Republic of Congo (DRC), tens of thousands of



artisanal miners and traders make their living from gold. Pact, a social development NGO, has been working in this region, with support from USAID and AngloGold Ashanti, since 2006. The majority of the communities with whom Pact



works are either largely or wholly dependent on ASM for their living and consultations with the communities regularly produce the request for assistance in accessing finance for ASM development or transition to a new livelihood.

For several years, Pact has led a successful economic empowerment program called "WORTH" for women in the DRC based on the provision of literacy training and the creation of savings groups. Following analysis of the potential suitability of the savings approach for ASM, the program was adapted for the ASM communities and a pilot project was started in Ituri in early 2009 with the aims of:

- ▶ supporting the self-generation of capital as an alternative approach to overcoming the challenge of access to finance;
- ▶ improving financial management skills to enable artisanal miners to start to address the problem of debt;
- ▶ increasing artisanal miners' ability to capture, save, and transform more of the value of the minerals they handle;
- ▶ improving literacy rates among young, male artisanal miners, many of whom were previously combatants in the Congolese army or the rebel militia

Miners who choose to join the program come together two times a week to work through their Swahili literacy training materials provided by Pact. Instruction is provided by local literacy volunteers, under the supervision and guidance of a Pact counselor. In Ituri, many of the literacy trainers are former teachers who lost their jobs in the wars and who currently work in the mines. This program gives them a chance to re-embark on their teaching career.

The groups undertake financial training and make regular contributions to a communal cash box. The funds contributed every week



are recorded and the security of the savings is maintained by a triple-key-holder system. These funds can be used by the group either as loan capital to any of the members, or as a communal facility to invest in equipment to improve – or exit – ASM. An initial survey of the participants' aspirations indicates that while some hope to move into gold trading, others propose to start trading in fish or meat; purchasing wood saws and chainsaws; purchasing seeds for agricultural production; or trading in fuel.

In the first six months of 2009, 272 men signed up to create 11 savings groups and the number continues to grow rapidly. Typically, savings activities start after three months of literacy training and group-strengthening activities. By June 09, 232 men were actively saving and in June each was saving an average of US\$2.38 (around 1,500 Congolese Francs) per month. At first glance, this may not seem like much, but the project is in very early stages and, typically (based on results from the Worth program), once the savers gain momentum the funds saved should increase. Collectively they have saved over \$550 so far.

It is too early to draw conclusions on the long-term success of the project, but the WORTH model has been used successfully by Pact to assist more than 200,000 women in 8 countries (DRC, Tanzania, Zambia, Uganda, Kenya, Ethiopia, Cambodia and Nepal) over 10 years. From this experience, there is a strong precedent and much useful learning to draw on. An in-depth evaluation of the program in Nepal showed high levels of sustainability, self-replication as well as many social benefits including: increased numbers of children going to school; the creation of mechanisms to resolve domestic disputes and gender discrimination and violence, improved access to health services, increased participation in community

action, increased self-confidence, and improved ability to cope with crisis situations (Mayoux, 2008).

At this point, one key observation in the DRC ASM pilot is that, for many of the young men, the literacy classes are a key driver for their participation. Almost 70% of the participants in the program have children who work in the mines and it is hoped that the opportunity to improve the parents' literacy levels will inspire them to try to get their children back into school.

Another observation that can be made with confidence is that the cohesiveness of the group is a critical element to success. The groups that progress most quickly with their literacy and who save the most are the ones where there is the greatest sense of solidarity and mutual support. This observation is supported by the work of other researchers who argue that some individuals join ROSCAs or SHMGs to cope with self-control problems. They argue that poor individuals simply cannot save alone since there are just too many claims on their cash (Ambec & Treich, 2007).

The participants themselves are keen to see the project develop and they suggest that



the next stage include provision of vocational and entrepreneurial training with business development support. To achieve this, the savings scheme first needs to be robust and implemented on a reasonable scale. Practically all successful new business activities involve some kind of personal savings. Starting a new venture only financed with credit is extremely risky. Savings, or grants, are needed (Mersland & Eggen, 2007). If the savings component can work for ASM communities, the move to credit has a much greater chance of success.

## Conclusions

Introducing a savings culture to ASM communities is critical in order to drive real empowerment and to permit greater purchasing power through building up of capital.

Savings groups are implicit contracts among equals which are built on trust and mutual respect. This permits the artisanal miner, often excluded, displaced, or dispossessed, to be recognized as a trustworthy person and to realize that his economic activity is valued. This can lead to increased self-confidence along with aspirations for a better future and self-sufficiency. Within savings groups, even those most marginalized are recognized and have the right to speak, which in turn enables them to regain pride and claim their rights in society at large. This was particularly important in the Pact/USAID/AGA Ituri project as a significant proportion of the young men in the program are ex-combatants.

Savings programs ensure stabilization of financial flows and reduce vulnerability to external shocks, as the participants move out of survival mode. This can ultimately allow them to develop a path out of poverty as they build up capital. Over time, this can contribute to accumulation of reserves via savings and inventory, in turn giving access to investment and property as the savers become creditworthy for larger loans.

This paper proposes that microsavings can be a powerful tool for ASM communities to address issues of access to capital, reduction of debt, improved capture of mineral-based incomes, and facilitation of alternative or supplementary sources of income for artisanal miners. If coupled with other training such as literacy, the package can have greater tenure and deliver enhanced social benefits.

Microsavings are not an exclusive alternative to microcredit, but it may be a precursor to and increase the success of other microfinance services, including credit, to succeed. Microsavings may not suit all groups or situations. Therefore, analysis of the needs of the group, as well as the potential benefits and limitations of various services, is essential to determining what menu of microfinance services is most suitable.

As the program in the DRC progresses, the emerging results will be shared with the CASM

network in the hope that this approach may find resonance with, and may be incorporated into, other ASM interventions elsewhere. The inclusion of microsavings components in ASM projects can be a low cost, high value project element with the potential to make a substantial difference in the lives and options available to artisanal miners.

## References

- AHLIN, Christian & JIANG, Neville (2005) *Can Micro-Credit Bring Development?* Working Paper No.05-W19. Department Of Economics, Vanderbilt University
- AMBEC, Stephan & TREICH, Nicholas (2007) "Roscas as financial agreements to cope with self-control problems." *Journal of Development Economics*: 82, 120-137
- BANCHIRIGAH, SM (2008) "Challenges with eradicating illegal mining in Ghana: a perspective from the grassroots," *Resources Policy* 331 (1)
- BARRY, Mamadou, Editor (1996) *A Summary of the Proceedings of the International Roundtable on Artisanal Mining Organized by the World Bank, Washington, D.C. May 17-19, 1995.* Industry and Energy Department Occasional Paper No. 6
- Cartier, Laurent E. (2009). "Livelihoods and production cycles in the Malagasy artisanal ruby-sapphire trade: A critical examination." *Resources Policy*. Volume 34, Issue 1-2, P 80-86.
- CHOUINARD, Rebecca & VEIGA, Marcello M. (2008) *Global Mercury Project: Results of the Awareness Campaign and Technology Demonstration for Artisanal Gold Miners – Summary Report.* United Nations Industrial Development Organization (UNIDO)
- CHURCHILL, Craig & GUÉRIN, Isabelle (2004) *Microfinance-led Strategies to Eliminate Bonded Labor.* International Labor Organization (ILO) Working Paper
- COUNTS, Alex & MERIWEATHER, Patrick (2008) *New Frontiers in Micro-Savings.* Grameen Foundation
- GUGERTY, Mary K. (2007) *You can't save alone: Commitment in rotating savings and credit associations in Kenya.* *Economic Development and Cultural Change*: 55, 251-282
- HULME, David (2000) *Is microdebt good for poor people? A note on the dark side of microfinance.* *Small Enterprise Development*: 11, 26-28
- KHAN, Ajaz Ahmed & MOULD, Helen (2008) *Islam and Debt.* Islamic Relief Worldwide
- LEVIN, Estelle Agnes & TURAY, Ansumana Babar (2008) *Artisanal Diamond Cooperatives in Sierra Leone: Success or Failure?* Diamond Development Initiative
- MAYOUX, Linda & Valley Research Group (2008) *Women ending poverty: The WORTH program in Nepal - Empowerment through literacy, banking and business 1999-2007.* Pact Inc.
- MERSLAND, Roy & EGGEN, Øyvind (2007) *You Cannot Save Alone - Financial and Social Mobilisation in Savings and Credit Groups.* Norwegian Agency for Development Cooperation (NORAD)

MMSD (2008) “\$10M World Bank Credit: Boom Time for Small-Scale Mining.” *Newsletter* July, 2008. Ministry of Mines and Steel Development, Nigeria

MORETTI, Daniele (2007) *Research Report on the Japan Social Development Fund Project on Artisanal and Small-Scale Mining in Papua New Guinea. Case Study No. 13. Artisanal and Small-Scale Mining in Asia-Pacific Case Study Series*

SPIEGEL, Samuel J. (2009) “Resource policies and small-scale gold mining in Zimbabwe.” *Resources Policy*, Volume 34, Issues 1-2, March-June 2009

WALSH, A (2003) “Hot money” and daring consumption in a northern Malagasy sapphire-mining town, *American Ethnologist* 30 (2), pp. 290–305.

WEBER-FAHR, Monika, STRONGMAN, John E., KUNANAYAGAM Ramani, MCMAHON, Gary & SHELDON, Christopher (2003) Mining. Chapter 25 of *Macroeconomic & Sectoral Approaches*, Volume 2, World Bank

## Endnotes

1. “Interest is considered an unjust and exploitative instrument of financing since the lender is assured a return without doing any work or sharing in the risk, while the borrower in spite of hard work, is not assured of a positive return. Furthermore, if the borrower’s investment is unsuccessful through no fault of his or her own, it is unfair for the lender to demand repayment. The prohibition of interest is therefore a mechanism to establish justice between the lender and borrower” (Khan & Mould, 2008)

## Dedication

For Alexis Gardella, our friend, who was an exceptional woman and an inspiration to all who knew her.

# Mercury Use in Artisanal and Small-scale Gold Mining (ASGM)

**Susan Egan Keane, Natural Resources Defense Council (NRDC)**

Artisanal and Small Scale Gold Mining (ASGM) is currently estimated to be responsible for 12% of the world's gold production or approximately 330 tons per year.<sup>1</sup> In addition to the 13 to 20 million small-scale miners directly involved in the industry,<sup>2</sup> ASGM supports the livelihood of over 100 million people in 70 countries.<sup>3</sup> This trend appears to be increasing as gold reaches record highs; the price of gold has risen from \$274.45 oz at the start of 2002<sup>4</sup> to \$912 oz in mid-May, 2009.<sup>5</sup>

## Mercury in ASGM

Mercury is commonly used in ASGM to amalgamate gold. Mercury is favored over other methods of gold extraction for a number of reasons, including ease of use, ready accessibility and relatively low costs. Because mercury techniques yield gold rapidly, mercury use enables the production of quick capital. Further, mercury amalgamation allows for a completely independent operation; the entire mining process can be accomplished by one miner, as opposed to some of the more costly and technically sophisticated methods.<sup>6</sup> Thus, even though other methods maybe theoretically more effective,<sup>7</sup> mercury amalgamation is a very practical and efficient method under the conditions typically found at ASGM sites.

Unfortunately, the use of mercury in ASGM can be devastating on a local, regional and global level. Once the gold has been collected, the mercury is burned off; the resulting vapors are directly inhaled by miners and their families, posing direct health risks to these individuals: one study of Peruvian children of ASGM miners found that nearly 85% of the sampled children had dangerous levels of mercury in their bodies.<sup>8</sup> Mercury is a potent neurological toxicant that interferes with brain functions and the nervous system. It is particularly harmful to babies and young children. Low-level exposure to infants during gestation is associated with attention span, fine-motor function, language, visual-spatial abilities (such as drawing) and verbal memory. In adults, mercury can cause

numbness and tingling, vision abnormalities, and memory problems.

In addition to directly affecting human health, mercury is often released into streams and rivers adjacent to mining sites, severely contaminating these water bodies. Further, because mercury is a global pollutant, the mercury released to air and water from ASGM sites becomes part of the total load of mercury circulating in the global environment. That means that mercury released in one country can disperse around the world, often falling far from its source of release and entering distant food supplies. In all, ASGM is estimated to release up to 1350 tonnes of mercury to the global environment annually.<sup>9</sup>

In recent years, the widespread use of mercury in ASGM has drawn the attention of the international community, and addressing this problem is a key component of a broader strategy to combat global mercury pollution. Notably, in February 2009, the United Nations Environment Programme (UNEP) Governing Council (GC) decided to begin negotiations on a legally binding international agreement to control global mercury pollution, which will include measures to control the use of mercury in ASGM. As one of the largest uses of mercury in the world, the ASGM sector received special attention from the UNEP GC in its Decision 25/5, in Para 34 (c), which called on governments to make progress on reducing mercury while the treaty details are negotiated; the Decision specifically requested governments to enhance efforts on "conducting awareness-raising and pilot projects in key countries to reduce mercury use in artisanal and small scale gold mining."<sup>10</sup>

As one vehicle to implement such projects, UNEP has created a Mercury Partnership for Artisanal and Small Scale Gold Mining, directed at promoting low-mercury and mercury-free ASGM techniques, among other objectives. UNEP's ASGM Mercury Partnership has adopted the goal of 50 percent mercury use reduction in ASGM by 2017, based on a recent report prepared for UNEP estimated that the use of mercury in ASGM could be reduced by 50 to 60 percent over the next decade<sup>11</sup> through strategic

and aggressive promotion of low-cost, practical cleaner production techniques for small scale miners that reduce mercury emissions without undermining economic benefits for the miners.

Finally, both the EU and the US recently passed legislation restricting the export of mercury, which will reduce its availability on the global market, and likely cause its price to rise. These circumstances may induce more artisanal and small scale miners to consider low-mercury and mercury-free methods for extracting gold.

### **What low-mercury and mercury-free techniques are available for artisanal and small scale gold mining?**

Because of the wide range of practices within the ASGM sector worldwide, there is no single solution for reducing or eliminating mercury use in ASGM. Available techniques to reduce and recycle mercury include:

► **Concentrate gold using gravity or other methods before mercury amalgamation:**

Some miners use mercury to amalgamate the whole gold ore, which requires large quantities of mercury. If miners instead amalgamate gravity concentrates, rather than whole ore, mercury losses can be significantly reduced. Further, the use of copper-amalgamating plates or addition of mercury into grinding circuits (e.g. ball mills or Chilean mills) causes mercury flouing, resulting in between 20 to 30% of the added mercury being lost to the tailings. Modifying these practices has a high potential for reducing mercury use.

► **Capture mercury vapour during burning using retorts, fume hoods or other methods:**

Capturing mercury when the amalgam is burned is a critical step to reduce emissions and to reduce direct exposure of miners and gold shop operators to mercury vapor. Simple home-made retorts and fume hood designs have been demonstrated to be effective at ASGM sites.

► **“Re-activate” Hg to increase its effectiveness in the gold amalgamation:**

Mercury that has been used and captured through retorting is not as effective at amalgamation as new mercury, due to some chemical reactions that occur during the process. Therefore, miners often do not want to use this captured mercury. To solve this problem, mercury can be “re-activated”

using a simple method using a solution of regular table salt and a battery source to create an electrical current. Using this method allows miners to recycle, rather than discard, the captured mercury.

Using just these relatively simple, low-tech interventions to reduce mercury use could theoretically result in dramatic reduction of emissions of mercury worldwide from ASGM. For example, if 90% emission control is attained from amalgam burning, and the captured mercury is reused, global consumption of mercury could drop by 25%. If mercury reactivation is widely adopted, and reactivated mercury is reused rather than discarded, global consumption could drop by another 25%. If elimination of whole ore amalgamation was widely adopted, global consumption could drop by an estimated 45%, although this change is likely to present a more difficult challenge, because it represents a fundamental change in practices.<sup>12</sup>

Techniques also exist that can replace mercury altogether in gold extraction. In some cases, depending on the type of ore, gravity concentration alone, particularly using specially designed sluice boxes, centrifuges or flotation, may be sufficient to separate out gold. Other mercury-free methods potentially suitable for small scale miners include direct smelting and cyanidation. Using cyanide to extract gold from ore is a common approach that is familiar to many small scale miners. Cyanide is used to leach gold from the ore or, preferentially, from concentrates. Gold is then precipitated from the cyanide solution using zinc, activated carbon or other methods.

Cyanide use is often considered an unattractive option for small scale miners because gold recovery typically takes longer with cyanide than with mercury. However, some recent field tests have demonstrated the advantages of using cyanide leaching in small ball mills, like the ones used now in Colombia, Ecuador and Indonesia for mercury amalgamation.<sup>13</sup>

Efforts should be made to prevent the use of mercury and cyanide together. Mercury-rich tailings are often leached with cyanide to recover additional gold. Leached mercury forms complexes with cyanide, and these complexes compete with gold during the zinc precipitation process (Merrill-Crowe Process) or during



adsorption by activated carbon. As a result, the effluents from these processes are rich in soluble mercury cyanide. In addition, some mercury remains in tailings after leaching, and these tailings, which now contain both residual mercury and cyanide, are dumped into rivers. Mercury-cyanide complexes are very mobile and are also very bio-available, as evidenced by high levels of mercury in fish that have been observed in the areas where artisanal miners are using both mercury and cyanide. This practice of using cyanide after mercury amalgamation has led to major environmental problems in Brazil, Ecuador, Indonesia, and Zimbabwe. Miners should be warned against this practice.

### **Social aspects of mercury use**

In addition to direct benefits for mercury emission reductions, programs to reduce mercury use in ASGM can be a good “point of entry” for working with mining communities on a wider range of social and economic issues, and can be a strong indicator of success in gaining trust and access to the communities.

Understanding both the technical and the social/economic drivers behind mercury use is critical for the planning and implementation of community-based mercury reduction strategies. These issues can include:

#### **Technical:**

- ▶ Suitability of technology for the type of ore mined
- ▶ Building and operational requirements of alternative technologies
- ▶ Education levels required of operator
- ▶ Time and cost of operations
- ▶ Effective grade yielded by different technologies

#### **Social/economic:**

- ▶ Legal status of miners
- ▶ Access to capital
- ▶ Risks to health and environment of alternatives compared to mercury
- ▶ Transportation/access to markets
- ▶ Access to alternative technology
- ▶ Established owner/worker/mercury trader hierarchy and division of profits
- ▶ Time frame for return in investment
- ▶ Ease with which the technology can propagate to other communities

As an example of one social dimension to consider, it is important to understand the

role that mercury plays in the financial system within the communities. In some cases, the use of mercury by miners allows for a division of profits that is advantageous to gold-buyers. For example, in North Sulawesi, Indonesia, mercury use for amalgamation reduces financial risk for operation owners of ball mills because the workers responsible for amalgamation keep only the amalgam as pay. If there is little or no gold in the ore, the operation owner loses no money. If there is gold in the ore, the operator allows the miner to keep the amalgam and sends the tailings to a cyanide operation to recover additional gold. In this way, the mercury becomes a signal of whether ore contains profitable quantities of gold.

As another example, in the processing of alluvial gold from Galangan, Kalimantan, Indonesia, landowners use ‘mercury men’ to provide mercury to the miners. These men ensure that the miners use large quantities of mercury so that the gold is diluted and some is left behind in the residual mercury after amalgamation, which they collect. The landowners then recover the excess gold.

Because of these types of practices, intervention strategies to reduce mercury use may be met with resistance by those profiting from its use. Cutting stakeholders out of profits is likely to cause unease and aggression within the ASGM community. These complicated dimensions must be taken into account when developing mercury reduction interventions.

### **Endnotes**

1. Telmer, K.H. and M.M. Veiga, 2008. World emissions of mercury from artisanal and small scale gold mining. In: Mercury Fate and Transport in the Global Atmosphere: Measurements, Models and Policy Implications. Interim Report of the UNEP Global Mercury Partnership, Mercury Transport and Fate Research Partnership Area. July 14. <http://www.cs.ia.cnr.it/UNEP-MFTP/index.htm>.
2. Stablum, A. 2008. Big increase in illegal gold mining as price rockets. Thomson Reuters, London.
3. Telmer and Veiga, 2008.
4. <http://goldprice.org/live-gold-price.html>
5. 2008. Draft business plan of the artisanal and small scale gold mining partnership area. UNEP Global Mercury Partnership.
6. Ibid.
7. Telmer and Veiga, 2008.
8. Counter, S.A., Buchanan, L.H., and F. Ortega, 2006. Neurocognitive screening of mercury-exposed children of Andean gold miners. *Int J Occup Environ Health* 12:209-214.
9. Telmer, K.H. and M.M. Veiga, 2008.

10. <http://www.unep.org/GC/GC25/Docs/GC25-DRAFTDECISION.pdf>

11. Telmer, K.H. and M.M. Veiga, 2008.

12. Telmer, K.H. and M.M. Veiga, 2008.

13. Cyanide tailings should always be neutralized using hypochlorate or chlorine – which destroys cyanide complexes.



# The ASM in Mozambique: Experiences, Challenges, and Opportunities for Rural Development

S. Mondlane Junior

**Emails:** salmond@zebra.uem.mz,

gm\_sc@tv cabo.co.mz

## Abstract

Gold panning has been widespread in the Archaean part of Mozambique since the Monomotapa Empire C. 1500 AD (Manuel et al., 1999). Presently, for example, artisanal and small-scale miners produce 100% of the country's gold, gemstones and guano. The ASM sector produces gemstones (aquamarine, tourmalines, garnet, and ruby), aggregates, gravel, construction sand, limestone, ceramic clays, guano and ornamental stones. Around 100,000 people are directly involved in the sector providing subsistence to at least half a million people in the rural and poorest areas of Mozambique. In Mozambique and other countries, with the exception of agriculture, mining is the only known alternative source of employment in rural areas. The sector not only contributes positively to the national GDP, but is also an important source of livelihood for many residents in the rural areas of Mozambique.

The government of Mozambique recognises the importance of this sector in provision of income, employment creation, reduction of rural to city migration and ensuring the economic growth in the rural areas. It is clearly perceived that regardless of the negative impacts that the ASM is associated with (e.g. ASM sector has often led to haphazard and wasteful mining, inefficient mineral processing, illegal trading, precarious living and working conditions, as well as severe environmental and social problems), it constitute the only choice for many Mozambicans, an issue that cannot be neglected by the authorities.

The revised Mining Law features a number of major changes, such as the legislation for a mining pass "Senha mineira<sup>1</sup>", which authorises ASM activities in pre-designated areas of less than 1000 hectares.

The generally poor economic performance of ASM is largely a result of miners not operating within legal frameworks.

The background paper will describe in brief the nature of ASM in Mozambique, its good practices (mainly related to financial assistance, legislation, regulation and organization of the sector), challenges (e.g. reduction of the negative impacts) and opportunities for rural development and breaking the negative cycle of poverty. The paper will capitalize on field cases and will attempt to prove that the sector can be viable and can significantly contribute for poverty alleviation as pursued by the Government of Mozambique.

## Background and nature of ASM in Mozambique

In terms of composition, the artisanal and small-scale mining (ASM) sector in Mozambique is not unique in the slightest, and therefore, the problems it faces are strikingly similar in scope to those faced by most comparative industries worldwide. Mozambican ASM operators are highly mobile, and, in many cases, are seasonal. The sector features an array of basic tools, and produces limited quantity of mineral.

The gold and gemstones extracted in the country are confined to artisanal and small scale, as there are no large-scale mines currently in operation. However, the products mined extend beyond gold and gemstones, and include semi-precious stones, gravel, aggregates, coal, limestone, guano, silica sand, bentonite, diatomite, bauxite and ornamental stones.

The introduction of the economic structural adjustment program (ESAP) in 1986 caused a mass displacement of workers. This, along with an extended period of drought between 1990 and 1993, prompted many retrenched workers and peasants to pan for gold in many provinces of Mozambique. By 1999, the number of gold panners had reached 20,000 in Manica Province alone, and, in the entire country, over 60,000 people were reportedly involved in ASM (Mondlane, 2001). Presently the exact number of ASM in Mozambique is not known, but it is believed that over 100,000 people are directly involved in ASM and over 500,000 people depend on this activity. In provinces like Tete, ASM is entirely seasonal, practised only during

the dry season. In Niassa and Manica, 30% of miners practise the activity seasonally in order to complement earning from agriculture, which is mainly practised in the rainy season (table 1)

In the ASM communities the number of people involved in economic activities such as agriculture, fishing, hunting and mining, is not known. Nevertheless, the Baseline Survey conducted in 2000 suggests that the largest proportion of income for artisanal miners comes from mining activities, with the exception of that of Tete, where some 91.7% of respondents (Valoi et al., 2000) depend on agriculture as employment (see Table 1).

In 2006, respondents (miners) to a survey (FFM, 2006) indicated that 46.1% of miners

Sources of income	Niassa	Tete	Manica
Agriculture	10.6%	91.7%	43.9%
Fishing	4.5%	8.3%	3.5%
Hunting	1.5%	0%	3.5%
Mining	83.3%	0%	49.1%
Total (Interviewed)	66	12	57

produced in average less than 50 grams of gold, 35.5% produced between 250 and 500 grams of gold and only 0.7% produced between 500 and 1000 grams of gold. These levels of production suggest that an artisanal miner earns in average between 75 US\$ and 1500 US\$ per month (2006 fixed prices).

Several authors have examined the socio-economic and environmental implications of gold panning in Southern Africa (e.g. Hollaway & Associates, 1992; SARDC et al., 1994; Manuel et al., 1999, Mondlane 2001, 2002). Each is in general agreement that ASM constitutes a major source of income for poor families in rural areas (Bezerra et al., 1996; Manuel et al., 1999 and, Mondlane, 2001, Mondlane and Shoko, 2003), and also helps to curb urban-rural drift.

By recognising that the sector constitutes an opportunity for poverty alleviation and rural development, the government of Mozambique has introduced and reviewed adequate legislation in 2002 and established the Mining Fund with specific task to promote and assist the ASM technically and financially. Recent studies suggest that the FFM assist around 30%

of the ASM in the central part of Mozambique (Dondeyne et al., 2008). For example the FFM has financially assisted the sector, between 2006 and 2007, in over 300,000 USD. The FFM assist small scale miners in the upgrading of their mines, exploration and upgrade of reserves in small scale miners, legalization of the associations of artisanal miners, provision of mining tools to mining associations, opening of road access, establishment of safe market for the ASM products.

The result of the integrated effort has been such that there are 62 designated areas in the 10 Provinces and 174 mining pass (licence for artisanal miners) between 2002 and 2007. There are 57 registered associations which incorporate 6127 members. This effort has had results in the level of formal commercialization of ASM products, specially gold which grow from 17 kg in 2002 to 242 kg in 2008, tourmaline from 124 kg in 2002 to 9809 kg in 2008, aquamarine (gem quality) from 26 kg in 2002 to 500 kg in 2008. Although this positive result of channelling the ASM production into the formal market represents presently between 20 and 30% of the estimated total production of the sector, it is highly encouraged.

## **Social, economic, and environmental issues/challenges**

### **Social issues in ASM communities**

There are two mining community types that have emerged: the village type and the camp type. The “camp” is similar to a peri-urban environment, in which people are more subjected to social risks. People in “camp” settlements have reduced food security, increased mortality, poor sanitation, are typically homeless and landless, and suffer from social disintegration and marginalization. The “village” type of settlement, however, has the advantage of having more space and therefore provides greater opportunity for ensuring family survival through agriculture. Illegal immigrants from neighbouring countries (Zimbabwe, Zambia, Malawi, and Tanzania) and as far as the Great Lakes are reportedly settling and bringing families to mining camps.

In Mozambique, the authority structures that interplay in ASM mining communities include local government (police), state administration (mining department), village secretaries,

traditional (traditional chiefs or regulos), religious figures (church/spiritual authority – curandeiros, mwenes or barozos), and mine camp leaders. In return for his work, miners “pay” to the traditional chief’s representative a bag (c. 50 kg) of gold ore to honour his role and power. Miners firmly believe that to succeed in their work, they require protection from their ancestors.

Among these, and most other groups, the majority are men. Women are predominantly involved in transporting, washing, and the panning of ore. Other supplementary services performed by women in support of artisanal mining include childcare, various family duties, household chores, and food and beverage sales (Mondlane and Shoko, 2003). Children between the ages of six and 10 are often involved in activities similar to those of women. In total, women and children constitute an estimated one third of the country’s mining population (Mondlane, 2001, MMSD, 2002, FFM, 2007, Dondeyne, et al., 2008).

There are a number of cultural barriers and superstitious beliefs that hinder women’s involvement in ASM activities. These range from the indigenous belief that the woman’s primary roles are as mother, food provider, and housewife (Valoi et al., 2000). In recent years, however, female participation has increased, with some women reportedly running more efficient mining enterprises than many of their male counterparts; however, most frequently find it challenging to secure financial, legal and technical aid. In some parts of the country, such as N’tulo, Niassa, women are not permitted to work at the mine site as men, because they are believed to attract “bad spirits”. In cases like these, women are only involved in food and beverage sales. In Manica, women are not permitted to dig trenches, and are confined to ore transportation and processing duties.

Health and educational services are limited within Mozambican mining communities, both in terms of numbers and capacity to respond to the needs of the population (Valoi et al., 2000). Generally, basic infrastructure is located at significant distances from mining communities; many mining communities do not have access to potable water, in which case, rivers and pits represent the primary sources of water for drinking, cooking and mining activities. However it is also true that nomadic nature of

the ASM limit the capacity of the government to plan and be able to provide basic social infrastructures. There are reported cases of villages where government has provided school and health centre which were abandoned after the exhaustion of the resource.

### **Economic issues in ASM**

ASM is almost always associated with some degree of poverty. Although the sector is frequently credited with providing employment to largely unskilled labourers, requiring small initial capital and infrastructure for start up, and producing minerals at depressed prices, the obvious trade-offs have been, at times, low-income levels and widespread poverty among so-called self-employed workers. As artisanal and small-scale miners begin with very little start-up capital, and often go into business during periods of harsh economic depression induced by drought and economic structural adjustment, most earn wages below the poverty datum line (Chiwawa, 1993). In most SADC countries, including Mozambique, with the exception of agriculture, mining is the only known alternative source of employment in rural areas. Employment figures in the sector have increased considerably during times of drought (Shoko, 2002) and during the last mineral price boom (2004 to present).

The general lack of financial and technical resources within the ASM sector has often led to haphazard and wasteful mining, inefficient mineral processing, illegal trading, precarious living and working conditions, as well as severe environmental and social problems. The result has been a reduction in potential incomes for artisanal and small-scale miners, and governments.

The generally poor economic performance of ASM is largely a result of miners not operating within legal frameworks, perpetuated by the fact that the government lacks adequate resources to assume the required facilitation role (e.g. mine inspection, market provision and access to finance, infrastructures). The DPMIREME in Mozambique has been involved in training miners to adopt safe mining methods and appropriate waste management systems. To help prevent the direct discharge of tailings into rivers, the DPMIREME have instructed miners to divert waterways, to construct dams, and wash and pan within basins outside of the main

riverbed. These efforts, in turn, have yielded positive results in the Manica Province. The immediate result has been a reduction in both siltation and mercury contamination in rivers. However, to ensure that miners adhere to the aforementioned techniques, DPMIREME staff have had to inspect sites regularly but efforts, overall, have been crippled by insufficient funding. The FFM also offers technical assistance to miners and is involved in the organization of the miners in associations and cooperatives. The legalized associations benefit from financial assistance provided by the FFM.

Provision of infrastructure and social services are keys to improving the sustainability of ASM activities, this, in turn, may promote or inhibits the official market channels of minerals produced by artisanal and small-scale miners.

There are an estimated 250 private gold traders in Mozambique. However, the country's complex gold market not only features legalized buying agents, but also the "Fundo de Fomento Mineiro" (mining development fund), and a plethora of unregistered buying agents. The complexity of the market structure is compounded by widespread illegal buying and production. The legal framework mandates that every gold producer sells mined product to the FFM, which had been established by the Ministry of Mineral Resources and Energy for the purpose of:

- ▶ Contributing to better knowledge of Mozambican mineral resources;
- ▶ Funding policy implementation for the country's mining industry;
- ▶ Funding and assisting the promotion of resident ASM activities; and
- ▶ Ensuring that the investment and the output from ASM activity is used to further develop the country's mining sector.

The FFM is the second largest buyer of gold, mainly because private dealers offer higher prices. However, the FFM plays an important role in supporting the marketing of gold in Tete, Manica, and Niassa, where it channels the gold produced by small-scale miners to official markets, and helps to establish production records. It also determines, using the Reserve Bank's policy as reference, an appropriate price for gold, which it offers to the industry's producers. Yet, dealers' modify the gold buying prices set by the FFM, in turn, offering

exploitative prices, much to the detriment of desperate small-scale miners. In Murrupula and Namuhara, traditional chiefs in consultation with mineral traders, also play a role in price fixing for gold (Valoi et al., 2000). Consequently, different prices are in place throughout the country, varying from US\$14 to \$18 per gram (2006 average floating prices); the highest prices paid are in Manica and Niassa, while the lowest prices have been reported in Zambézia and Tete.

These merchants sell gold in cities, where a number of craftsmen work the products for jewellery while the rest of the gold is exported legally and illegally. The jewellery is sold locally in these cities and in Maputo. In terms of illegal smuggling, illicit marketing is particularly pronounced in Niassa. Tanzania is readily accessible from Niassa's gold mining areas, and most of Mozambique's gold buyers are, in fact, Tanzanian, to whom most indigenous miners sell non-quantifiable amounts of gold directly, often within Tanzanian borders.

#### **Environmental and health-related issues in ASM**

As already indicated, most ASM activity in Mozambique is seasonal, occurring during the non-agricultural season, or when agricultural yields are poor as a result of rampant drought or flooding. The number of artisanal and small-scale miners has increased significantly in Mozambique since 2000, largely because of two successive and devastating floods during the 2000-2001 and 2001-2002 rainy seasons, which were accompanied by short rainy seasons. It can be concluded from field visits that ASM in Mozambique has been an important source of employment, has intensified immigration, and facilitated local economy improvements. It has also precipitated the formation of new settlements; caused a mass degradation of natural resources (loss of vegetation, land); and has created a wealth of social problems, including conflicts, and health- and sanitation-related complications.

In Mozambique, the environmental impacts of ASM activity are quite visible. Most result from deteriorated soils (siltation and water quality), deforestation, and the use of mercury in gold recovery (Mondlane and Shoko, 2003, zacarias and Manuel, 2003, Spiegel, et al., 2005, FFM, 2006). Deforestation has occurred largely

because of the sudden sprawling of 'gold rush camps'; the construction of surrounding mining villages has also required an extensive cutting of trees to create space, and for building materials and fuel. In Manica and Nampula, rivers are diverted and water is collected in open pools for gold washing.

Occasionally, ASM have worked areas rehabilitated by big companies, such as the Chua River near Manica, where artisanal miners worked areas rehabilitated by the ALMA/BENICON company.

In Manica, Zambézia and Niassa Provinces, mercury is used intensively in gold processing activities where primary gold quartz veins are worked. Spiegel et, al., 2006 indicate that miners in Manica show levels of contamination around 8.23 µg/m<sup>3</sup>, about 8 times the WHO recommended levels of Hg in humans. The amount of mercury that is used for processing one gram of Au, range between <1 and 15g, hence potentially released into the environment. However, water and river contamination has not only resulted from mining activity in Mozambique. Gold mining activity is rampant upstream along the banks of Mazoe, Luenha, Revue and Zambezi rivers, which drain eight of the fourteen SADAC countries – namely, Angola, Botswana, Malawi, Namibia, Tanzania, Zambia and Zimbabwe (Mondlane, 2001).<sup>2</sup> The communities in the vicinity of mine sites, in turn, are exposed to mercury through inhalation and/or consumption of contaminated water. Non-gold mining communities, particularly those situated downstream, are at major risk of exposure to methylmercury through consumption of mercury-contaminated fish. Vegetables grown on the riverbank are irrigated using the contaminated river water.

Miners themselves are at a high risk of mercury exposure due to direct skin contact during amalgamation and via inhalation of mercury vapour during the roasting of the amalgam. Handling or eating of food with hands contaminated with mercury leads to additional contamination. Storage and handling of mercury at camps in artisanal gold mining areas further increases exposure. The process of amalgamation itself frees up to 60% of mercury into the atmosphere. Previous studies in Brazil have shown that about 60% of the mercury used in gold ore processing is lost into the

atmosphere during amalgamation, while 30% enters river systems through tailings.

The transfer of appropriate mercury technology has been hindered by a number of factors, including costs, a lack of training, and suspicion on the part of the miner. In Manica, ASM operators do not use mercury retorts and TermEx technology because they are too expensive to purchase and to maintain. Some miners cited the unavailability and low efficiency of various retorting systems as additional reasons for not adopting them (Valoi et al., 2000, Mondlane and Shoko 2003).

The most common health-related problems in ASM communities result from rampant diseases, including malaria, STDs, diarrhoea, and tuberculosis. In fact, ASM communities serve as a vector for the spreading of disease. Most Mozambican ASM communities do not have access to requisite health services, largely because of the remoteness of sites and the high mobility of mining communities. When efforts have been made to establish health and educational facilities, such as the case of Nampula province, where a community of 10,000 people was assisted by government in constructing a school and hospital, they are typically abandoned after deposits are exhausted, as miners vacate the area in search of other prospective deposits (Mondlane 2002).

### **Contribution of ASM in Poverty Alleviation**

Although the ASM sector in Mozambique is plagued with a number of problems, each of which must be resolved in order for the sector to contribute to growth and development in a more positive fashion. These stumbling blocks are both socio-economic and environmental in nature, and are directly and indirectly related to poverty, population pressures exerted upon natural resource stocks, as well as a general lack of knowledge.

The alleviation or elimination of poverty is believed to be the panacea for the ASM sector's plethora of problems. Poverty is endemic, particularly in the remote rural areas of Mozambique, where ASM is, in fact, proving to be a means of poverty alleviation. The limited success with poverty alleviation in the sector in Mozambique, as is generally the case in most of the southern African region, has deep roots, fuelled largely by reduced ability of the

government to assist. This cavalier stance is, in part, rooted in the remote and scattered nature of the economic activity, which makes the registration and formalisation of these activities prohibitively expensive. As long as the sector continues to operate outside of the State's legal and institutional framework, the central government will continue to lose out on the full benefits accrued from mineral sales, royalties or taxes. Without such clearly defined benefit streams, the government will continue to be reluctant to play its usual facilitation role of providing infrastructure (e.g. schools, hospitals/clinics and roads). Moreover, if effective registration and formalisation procedures are not in place, artisanal and small-scale miners cannot access micro-finance for development capital, which forces them to make use of middlemen for marketing their minerals (who very often exploit their ignorance and despair) – hence perpetuating further the vicious cycle of poverty that characterized the industry.

At community level the ASM is only tolerated if it is developed in such a way that the community benefits from the activity, by spill over of the mining income. The ASM income fuels the economy in the surrounding villages and communities by increasing the purchasing power of basic goods, investment in activities different from mining such as local transport, shops and food production. All these economic activities contribute in the reduction of unemployment in the rural areas and increase business opportunities for ancillary activities such as beverage and food selling.

## References

- Bezerra, O., A. Veríssimo and C. Uhl, 1996 – The regional Impact of small scale gold mining in Amazonia, Mining and Environmental Research Network, Bull. no. 10: 50 – 53
- Chiwawa, H. 1993. Environmental impacts of cooperative mining in Zimbabwe. 4th Congress, Organisation for Social Science Research in Eastern and Southern Africa, Debra Zeit, Ethiopia, 25pp
- Dondeyne S., Ndunguru E., Rafael P., Bannerman J., 2008 – Artisanal Mining in Central Mozambique: Policy and environmental issues of concern; in prep.

Fundo de Fomento Mineiro 2006

Holloway, J. and Associates, 1992 – Environmental effects of Mining in Southern Africa, A presentation to the Mining and Environment Workshop for the SADC

Manuel I., T. Muacanhia, R. Zacarias and Vicente, 1999 – Exploração artesanal do ouro no Distrito de Manica: Degradação ambiental versus desenvolvimento; Congresso de Geoquímica dos PALOPs

MMSD – Final report, 2002 – Breaking New Ground (Mining, Minerals, and Sustainable Development); Earthscan, London and Sterling, VA; 441p.

Mondlane S, Shoko DSM., 2002 - The socio-economic and environmental impacts of artisanal and small scale mining in Mozambique. In Gavin H (ed). The Socio-Economic Impacts of Artisanal and Small Scale Mining in Developing Countries. Rotterdam, The Netherlands: Blackwell Publishers

Mondlane S., 2001 – Small Scale Mining and Sustainable Development in Southern Africa: A baseline survey for Mozambique; in B. Dreschler (Ed.), Small-scale mining & sustainable development within the SADC region, MMSD Southern Africa Report on Research Topic 1; RT1 ITDG, Harare: pp. 27- 58

SARDC, IUCN and SADAC, 1994 – The state of the environment in Southern Africa, Gaborone

Spiegel, S. J., Savornin O., Shoko D., Veiga M. M., 2006 – Mercury reduction in Munhena, Mozambique: Homemade solutions and the social context for change; INT J OCCUP ENVIRON HEALTH, VOL 12/NO 3 • www.ijoh.com

Valoi G., Kazilimani E., Bukali F., 2000 - Artisanal Mining Baseline Survey: Mozambique; Final Report. Minist. Min. Res. And Energy; Maputo; 124p.

Zacarias R., and Manuel I., 2003 – Assessment of mercury use in artisanal gold mining in the Manica District of Mozambique: The need to assess the impact on human health; In: Artisanal and small scale mining in Developing Countries; Urban Health and Development Bulletin, V. 6 no. 4; pp 57 – 61

## Endnotes

1. License for artisanal miners in designated areas
2. SADC: Project AAA.4.1 – Environmental Impact of mining and related industries on the water quality of the rivers of the Zambezi Basin, and Project AAA.4.3- Investigation of the pollution, river bank degradation and siltation caused by small scale mining and the use of mercury and cyanide



# Climate Change and ASM: The Facts and Implications<sup>1</sup>

Written<sup>1</sup> by Estelle Levin<sup>2</sup> of Resource Consulting Services, for the 9th Annual CASM Conference

## Introduction

Climate change is the issue of the 21st century. If we continue on present-day development trajectories and the climate changes as scientists are predicting, the social and environmental consequences will be devastating to life as we know it on Earth.<sup>3</sup> There is ample evidence that anthropogenic climate change has already begun. The question is no longer, 'Is climate change happening?' but 'Since climate change is happening, what should we do about it?'

All is not lost, however. Scientists are confident that "many impacts can be reduced, delayed or avoided by mitigation" and with due attention, it will be possible for many societies and sectors to adapt.<sup>4</sup> But it is essential we act strongly now.<sup>5</sup>

Climate change is mostly attributable to the actions and consumption levels of the developed world. Experts expect the poor and elderly in general, and developing world ecosystems and societies in particular, to be especially vulnerable to its impacts.<sup>6</sup> This is bad news for artisanal miners, who live mostly in the developing world.

Responsibility for mitigation and adaptation rests with all human beings and institutions, in all of our daily roles – as individuals, households, companies, communities, governments, and workers – if we want future generations to enjoy the same or improved biological, physical and cultural heritage that we inherited from our progenitors. But what does this mean for the artisanal and small-scale mining (ASM) sector? How can we limit ASM's contributions to climate change, and how can ASM communities adapt to the threats that climate change poses? This paper provides a background on climate change, and considers these questions in order to set the stage for developing a plan of action on climate change and ASM by CASM.

## An overview of climate change

### Definitions

Generally, the Intergovernmental Panel on Climate Change (IPCC) defines climate change as "any change in climate over time, whether

due to natural variability or as a result of human activity."<sup>7</sup> More specifically, in relation to the phenomenon that we call climate change, the United Nations Framework Convention on Climate Change (UNFCCC) states that "climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods."<sup>8</sup>

### Key institutions

The principal institution for coordinating scientific, technical and socio-economic research and knowledge on climate change is the Intergovernmental Panel on Climate Change (IPCC). The IPCC was established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) in order to provide expert advice to decision-makers, especially national governments.<sup>9</sup> It uses global emissions scenarios to project future impacts of climate change and propose response strategies to mitigate and adapt to these impacts (IPCC 2007b). In short, the IPCC tries to increase our understanding of climate change and provides advice on what to do about it at a regional and global scale. Other studies have utilized the IPCC scenarios to project alternative climate futures at the local scale (Shaw et al. 2009; World Bank 2008a and b).

Key mechanisms for coordinating international policy responses to climate change are the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The UNFCCC is an international treaty between nations and provides a "framework for intergovernmental efforts to tackle the challenge posed by climate change."<sup>10</sup> Under the convention governments share information, launch national strategies for mitigation, and cooperate to prepare for adaptation. The UNFCCC came into force in March 1994 and is nearly universal, with 192 members. The Kyoto Protocol is an international agreement linked to the UNFCCC that requires 37 countries and the European Community to achieve certain targets for reducing their greenhouse gas (GHG) emissions.<sup>11</sup>

## Key facts<sup>12</sup>

### Evidence

- ▶ The climate is warming, made evident from increases in global average surface air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.
- ▶ Observational evidence from all continents and most oceans show that many natural systems are being affected by regional climate changes, particularly temperature increases and more frequent storm events.

### Causes

#### Greenhouse gases

- ▶ Atmospheric concentrations of greenhouse gases (carbon dioxide – CO<sub>2</sub>, methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), and halocarbons) have been increasing since 1750 (the beginning of the industrial age). GHGs increase when emissions are larger than removal processes (e.g. through the natural carbon or nitrogen cycles). Global total annual anthropogenic<sup>13</sup> greenhouse gas (GHG) emissions have grown by 70% between 1970 and 2004, and the rate of growth in emissions is increasing decade upon decade. Since this rate of increase is faster than the removal process, a lag effect has delayed impacts.
- ▶ Most GHGs are emitted from burning fossil fuels, but also come from waste, agriculture, deforestation, biomass decay, and disturbance of peat ecosystems.
- ▶ The largest growth in GHGs comes from energy, transport and industry. In 2004, industry (which includes mining) contributed 19.4% of all GHG emissions.
- ▶ Developed countries are primarily responsible for historic GHG emissions. In 2000, the 20% of the world's population living in the developed world ('Annex I' countries<sup>14</sup>) produced 46% of global GHG emissions, averaging 16.1 tonnes of CO<sub>2</sub> per capita. Average per capita production of CO<sub>2</sub> in the developing world was 4.2t. However, GHG emissions in the developing world, especially China and India, have been growing significantly since 2000.

#### Environmental damage

- ▶ Changes in how we use the land have removed important 'sinks' which absorb

GHGs as part of the ecosystem's carbon and nitrogen cycles. For example, plants absorb carbon as they grow and release it when they die and decay. Deforestation and the destruction of ecosystems, especially in the tropics, contributes to an increase in atmospheric nitrogen and carbon.<sup>15</sup> Where artisanal miners clear and burn vegetation, they are contributing to climate change.

#### Climate and ecosystem sensitivity

- ▶ Warming of the atmosphere amplifies the impacts of GHGs, creating positive feedback loops which enhance climate change. For example, warming reduces terrestrial and ocean uptake of atmospheric CO<sub>2</sub>, increasing the fraction of anthropogenic emissions remaining in the atmosphere, so increasing warming.
- ▶ Net carbon uptake by terrestrial ecosystem 'sinks' is likely to peak before 2050 and then weaken or even reverse, thus amplifying climate change.

#### Consequences

We are faced with multiple possible futures. It is difficult to predict the character of climate change and its impacts without being able to predict how human society will develop. IPCC scientists have produced a number of scenarios of human development from which the probable extent and impacts of climate change can be surmised. These scenarios make assumptions about policy,<sup>16</sup> economic growth, economic structures (e.g. industry or service-based), global population, fossil fuel use, and rates of technological advancement. The consequences set out here are those anticipated should we continue on current development trajectories. If we can accelerate the pace at which we can slow down and even reverse GHG emissions, the impacts will be less severe.

#### Climate change

- ▶ For the next two decades, a warming of 0.2°C per decade is anticipated. A total global warming exceeding 2 to 4.5°C since 1750 is very likely.
- ▶ Scientists speak of a 'tipping point,' i.e. an overall temperature increase at which some changes may be sudden and irreversible. Different models predict this to be at different points, but generally agree that if average total global warming exceeds

### Box 1: How does ASM contribute to climate change?

The contribution of most ASM to GHG emissions is negligible, especially when compared tonne for tonne with large-scale operations, and other economic sectors.<sup>17</sup> Most ASM is done manually or is semi-mechanised with machinery being predominantly limited to water pumps and earth-moving equipment. Use of fossil fuels is therefore not substantial in artisanal mining operations per tonne of ore mined, when compared to large-scale operations. Cumulatively, however, the contributions of ASM operations could be substantial.

On the other hand, the transport of bulk minerals, like coal or gypsum, or the ores of precious minerals and base metals, like gold or cassiterite, could make significant contributions to GHG emissions.

By far the bigger contribution made by ASM to climate change is the damage they cause to the environment by clearing forest; altering river morphology; poaching for food; polluting air, soil and water with tailings, waste, and sewage; and leaving mining pits un-reclaimed. These activities destroy habitats and damage species resiliency, so undermining ecosystem resiliency. As ecosystems become less resilient to change, the probability of local species extinction and biodiversity loss is increased, potentially with devastating consequences. In this sense, ASM are increasing the likely impact of climate change by damaging GHG sinks, and are undermining ecosystems' and thus peoples' adaptive capacity.

ASM communities often live in poverty. Lack of access to electricity and efficient technologies for cooking, heating and electrification encourage dependency on carbon-intensive and environmentally-damaging materials, such as wood, charcoal or coke, and gasoline for generators. Helping ASM get out of poverty could help mitigate their GHG emissions.

- ▶ 3.5°C the consequences for ecosystems and human society will be devastating.
- ▶ With current climate change mitigation policies and related sustainable development practices, GHG emissions will continue to grow over the next few decades.
- ▶ Scientists believe it is possible to limit overall global warming to 1.5°C and reach climate equilibrium by 2050, if we act quickly. However, warming and sea level rise will continue for centuries even if GHG emissions are reduced enough to allow GHG concentrations to stabilise.
- ▶ Changes in the global climate system in the 21st century will very likely be larger than those observed in the 20th century and the changes could go on for centuries.
- ▶ Precipitation will increase at high latitudes and decrease at low latitudes.
- ▶ Sea level rise.

Consequently, some systems, sectors, and regions will be especially affected by climate change:

- ▶ Tundra, boreal forest, mountain, Mediterranean-type, mangrove, salt marshes, coral reefs, and sea-ice ecosystems.
- ▶ Low-lying coasts; river systems; and water resources in some dry regions at mid-latitudes, the dry tropics, and areas dependent on snow and ice melt.
- ▶ Agriculture in low-latitude regions
- ▶ Human health in areas with low adaptive capacity, e.g. developing world.
- ▶ Arctic, Africa, small islands, and Asian and African megadeltas.

In sum, these impacts mean that problems related to hunger, displacement, poverty, health, and access to clean water will increase, especially in the developing world, as follows:

- ▶ **Ecosystems:** the resilience of many ecosystems is likely to be exceeded this century. Present ecosystem disturbances (e.g. pollution, deforestation, fragmentation of natural systems, over-use of resources) will exacerbate the problem. Approximately 20-30% of known species are likely to be at increased risk of extinction. If temperature

#### Impacts

General physical impacts include:

- ▶ Greater warming over land than sea;
- ▶ Snow and ice cover are projected to contract, affecting polar, mountainous and permafrost regions.
- ▶ Increased frequencies and intensities of some extreme weather events, e.g. heat waves, tropical cyclones, heavy precipitation events, floods, and drought.
- ▶ Extra-tropical storm tracks are projected to move poleward, with consequent changes in wind, precipitation and temperature patterns.

changes exceed 1.5°C there will be major changes in ecosystem structure and function, species' ecological interactions and geographical ranges, with predominantly negative consequences for biodiversity and ecosystem goods and services.

- ▶ **Food:** At lower latitudes, especially in seasonally dry and tropical regions, crop productivity is projected to decrease, which will increase the risk of hunger. Globally, food production is anticipated to increase so lower latitudes will be further import-dependent. Development of non-agricultural economic sectors, like mining, will be vital for ensuring social resiliency in these regions.
- ▶ **Coasts:** Coasts will be exposed to increasing erosion and flooding. By the 2080s, millions more people than today will experience floods. Densely populated, low-lying

- ▶ **Water:** Impacts on water availability will be severe in places currently dependent on freshwater sources. Runoff will increase in some wet tropical areas (e.g. East and S.E. Asia) and decrease in some dry regions at mid-latitudes and dry tropics (e.g. Southern Africa, north-eastern Brazil). More places will be affected by drought. Increased flood risk will pose challenges to society, physical infrastructure and water quality. The frequency and severity of floods and droughts will increase.

## Conclusions

### Mitigation

- ▶ ASM's contribution to GHG emissions is negligible, when compared with large-scale mining tonne for tonne and when compared with other economic sectors, e.g. agriculture, transport.

### Box 2: How are ASM likely to be impacted by climate change?

Most of the world's 20 million artisanal and small-scale miners live in low latitudes, which will be most severely affected by climate change in terms of drier, hotter weather, changes in precipitation and river flow patterns, and exposure to more intense extreme weather events. Together these changes will lower agricultural productivity, make access to water harder, especially potable water, and induce displacement. ASM also tend to be poor and have limited capacity to cope with increased environmental, economic and social stresses. They are already subject to serious exposure to risks related to hunger and malnutrition, health, sanitation, and inadequate infrastructure, and this exposure will likely worsen.

ASM often occurs in rural and peri-urban communities where other major livelihoods are agriculture and trade. Development of non-agricultural economic sectors, like mining, will be vital for ensuring social resiliency in these regions. The population of those actively engaged in ASM is likely to increase significantly.

Millions of ASM operate in riverine, mountainous, desert, and coastal terrains. The impacts of climate change on ASM operating in river basins and on coasts could be especially severe. For example, scientists anticipate that changes in precipitation and glacial melt will increase the risk of flooding and change river flow patterns.<sup>18</sup> These will lead to the devastation of infrastructure and alterations in mining seasons respectively. Some rivers may dry up completely, and no longer transport the mineral bearing gravels to traditional mining areas. Consequently, some placer mining sites will no longer be productive, forcing miners and their communities to migrate to look for work.

megadeltas in Asia and Africa, and small islands will be especially affected.

- ▶ **Industry, settlements, society:** Those in coastal and river flood plains will be especially vulnerable, as will those in areas prone to extreme weather events (e.g. cyclones). Poor communities will be especially vulnerable.
- ▶ **Health:** Millions more will be affected by malnutrition and diarrhoeal diseases. The spatial distribution of some infectious diseases and malaria will be altered.

- ▶ The bigger contribution made by ASM to climate change is damage to the environment, including affecting the resiliency of other species and ecosystems, and altering the physical landscape.
- ▶ ASM's contributions to climate change could be minimised by: Ensuring all fuel-powered machinery and vehicles are well maintained for optimal fuel efficiency. This will also have economic benefits.
- ▶ Using alternative technologies to provide power, heat, and light both in the mines

and mine communities (e.g. solar panels or hydropower, rather than generators; basic solar cookers and heating technologies)

- ▶ Establishing processing facilities near the mine site to minimise the transportation distance for unprocessed ore.
- ▶ Improving river, road and rail infrastructure to enhance vehicle carbon efficiency and reduce dependence on air transport of bulk ore minerals (e.g. cassiterite).<sup>19</sup>
- ▶ Improving environmental management at mine sites, e.g.
  - ▶ Minimising deforestation and damage to habitats
  - ▶ Minimising pollution to air, soil and water through managing the disposal of tailings, waste, and sewage;
  - ▶ Minimising the use of mining techniques that damage river morphology and ecosystems, and increase flood risk;
  - ▶ Backfilling mined out areas as a minimum, and rehabilitating them for productive use by ASM communities, e.g. through agricultural or social programmes.
- ▶ Marketing artisanally-mined precious minerals as 'carbon-light' in exchange for a premium, which would go to a fund to invest in mitigation or adaptation projects in ASM communities or countries.

#### **Adaptation**

- ▶ The geography of ASM will change as changes to the climate will alter hydrology. Some traditional ASM sites will become unviable, leading to migration.
- ▶ **ASM is an opportunity** for climate change adaptation in many developing countries, especially at low latitudes where agriculture will become a less viable livelihood, making ASM more appealing.
- ▶ According to the World Bank, "many believe that the best hope for adaptation to climate change is through economic development"<sup>20</sup> because development implies economic diversification and resiliency, greater resources for risk abatement including emergency response systems, stronger societies better able to manage health, food, and water stresses, and the construction of physical infrastructure that enables the protection of people and matter (e.g.

roads, coastal dykes, flood management systems). The principal means of helping ASM communities adapt to climate change will be to help them develop socially and economically but in ways that will not contribute to climate change.

- ▶ In this context, it is imperative that these countries have appropriate hard and soft infrastructure to enable formal, professional and responsible, artisanal mining which contributes to local and national poverty alleviation and does not undermine environmental and social resiliency.

#### **Stakeholder responses and policy directions**

This system which has evolved to deal with climate change is primarily global and national in outlook, expert-driven, and aimed at enhancing understanding. For these reasons, it has been less successful at communicating how climate change is affected by and will affect people at the local level (Shaw et al. 2009). This is where institutions like CASM, development agencies, national and regional governments, and NGOs have an important role to play. Many of these institutions are now putting climate change front and centre in their strategic planning, including most importantly the US whose attitude to the issue changed dramatically and positively with the election of Barack Obama in 2008.

The objective (and challenge) of current approaches is managing responses to climate change whilst achieving sustainable development.<sup>21</sup> The dilemma in this approach is predominantly felt in decisions around whether decision-makers should prioritise mitigation or adaptation when allocating limited resources. Policy experts tend to take the view that "mitigation requires global collective action and thus the solution of immense political changes" while "it is possible to address adaptation through local actions."<sup>22</sup> Consequently development agencies seem to be prioritising strategies for adaptation in their engagement with the developing world, especially given the limited role developing countries have had in creating the problem.<sup>23</sup> The private sector, under pressure from civil society, is seeking ways to increase its mitigation contribution, for example through efforts to decarbonise supply chains.<sup>24</sup>

Climate change is a new issue on the ASM agenda. The first step is to develop climate change strategies for the global and national ASM sectors. For ASM and their stakeholders, like CASM and their governments, any assessment of their mitigation and adaptation possibilities must be done in a participatory way, in *partnership* with the miners and other

relevant stakeholders, if the strategies for intervention are to be likely to succeed.<sup>25</sup> Thus these ASM climate change strategies should be developed with key stakeholders around the table, namely the miners, their governments, development agencies, and civil society groups (including those working on environmental security and social issues).

### Box 3: How should we respond?

As yet, a coordinated response to climate change has not been developed for the ASM sector. CASM could do this by developing and coordinating the implementation of a CASM Climate Change Action Plan (CCCAP) for the ASM sector, in partnership with key institutions, governments, and experts. The first step would be to establish a Task Force of these stakeholders who will direct the development of the CCCAP. They will define objectives, research, policies, and actions, as the basis for the CCCAP.

**Possible objectives** might be to identify priority avenues and actions for mitigating climate change through ASM and to identify priority avenues and actions for helping ASM adapt to climate change and its impacts. These objectives could be global, national and/or local in scope.

**Possible research could include:**

- ▶ Review other sector climate change strategies (e.g. artisanal fisheries, agriculture) to consider key questions and methods for analysis.
- ▶ Extract key lessons from past programmes on how these did or did not compound or alleviate climate change.
- ▶ Perform an emissions inventory to assess fully the GHG emissions of different types of ASM for different types of minerals, and in comparison to large-scale mining of these minerals.
- ▶ Conduct a materiality assessment of climate change on the ASM sector by geography and mineral to identify ‘hot-spot’ ASM communities for assessment and intervention.<sup>26</sup> Assess these in terms of cost-benefit ratios (‘no regrets’, ‘some regrets’ and ‘high regrets’) under various scenarios to prioritise actions for mitigation and adaptation.<sup>27</sup>
- ▶ Identify countries with significant ASM sectors and assess their climate change strategies, where they exist, for content specific to ASM, as a basis for engaging to make their climate policies ASM-sensitive.
- ▶ Identify countries with large ASM sectors<sup>28</sup> which are particularly at risk from climate change. Assess their climate change strategies, as a basis for engaging to make their ASM sector strategies climate-sensitive.
- ▶ Identify countries with significant specific GHG footprints from conventional, large-scale mining and assess their potential for mainstreaming low-footprint ASM.

**Possible actions** will emerge from the research, but they might include:

- ▶ Education:
  - » Educating miners on climate change, their role in causing it, and how they will be affected by it.
  - » Sharing expertise with ASM country governments so that they are totally au fait with how climate change impacts and is impacted by their artisanal mining sectors to help them prepare and plan for optimal mitigation and adaptation strategies. These strategies may include formalisation schemes for ASM, to enable farmers and pastoralists affected by climate change (e.g. droughts in Mongolia and East Africa) to have a resilient ASM sector to transition into.
  - » Educate development professionals working on climate change on the importance of ASM.
- ▶ Integration:
  - » Build on work done on climate change and development in ASM countries by integrating an ASM approach into these analyses.<sup>29</sup>
  - » Just as all development programmes are now expected to have gender thinking streamlined into their design and implementation, so climate change should be a central theme for any potential ASM programme. Programme designers should ensure that they ask the following questions:
    - » How might this programme and the changes it is seeking to make contribute to the problem of climate change?
      - How might it be done in ways that help minimise artisanal miners’ contributions to climate change?

- What are the likely impacts of climate change on this ASM country or community?
  - How might these be planned for within this programme?
- How might this programme affect the ability of ASM and other populations to adapt to climate change, either positively or negatively?
  - How might it be designed to build the resiliency of its stakeholders, making them better able to adapt to climate change impacts or not?

Specific mitigation and adaptation responses that ASM communities and their country governments can do will emerge from the enquiry, assessment, and planning process for developing the ASM strategy. Some possibilities were set out in the conclusions above.

## References

IPCC (2007). *Climate Change 2007: Synthesis Report*. Cambridge: Cambridge University Press.

Mudd, G. (2007) "Global Trends in Gold Mining: towards quantifying environmental and resource sustainability" in *Resources Policy*, (32), 1-2, March – June 2007, pp. 42-56.

Nielsen, R. (2006) *The Little Green Handbook: Seven Trends Shaping the Future of Our Planet*, Picador, New York

Stern, N. (2007). *The Economics of Climate Change: the Stern Review*. Cambridge: Cambridge University Press.

Shaw et al. (2009). Making Local Climate Futures Tangible: Synthesizing, downscaling, and visualizing climate change scenarios for participatory capacity building. in *Global Environmental Change*, IN PRESS.

USAID (2008). *Integrating Climate Change into Development*, November 2008.

World Bank (2008a). *The Economics of Adaptation to Climate Change: Concept note and study plan – 4/18/2008*.

World Bank (2008a). *The Economics of Adaptation to Climate Change: Methodology*, December 2008.

## Endnotes

1. This paper has been written for use at the 9th Annual CASM Conference in Mozambique in September, 2009. It is directed at people who are familiar with ASM but not so familiar with climate change. If this paper is to be developed for a wider audience, more background information on ASM would be necessary.

2. The author would like to thank Dr. Alison Shaw and Dr. Felix Hruschka for their extremely useful reviews of the first draft.

3. The IPCC states that "unmitigated climate change would, in the long term, be likely to exceed the capacity of natural, managed and human systems to adapt" (IPCC 2007, p. 73).

4. IPCC 2007, p. 73. There are two main types of response to climate change: mitigation and adaptation. Mitigation means changing our behaviours so that we reduce our contributions to climate change, e.g. travelling by train instead of plane, protecting existing and replanting destroyed forests, or limiting the negative environmental impacts of mining, for example. Adaptation means building resiliency by reducing our impacts on the physical and biological environment and by preparing society to be able to cope with how climate change will affect each of our countries, communities, and families.

5. "The effects of our actions now on future changes in the climate have long lead times. What we do now can have only a limited effect on the climate over the next 40 or 50 years. On the other hand what we do in the next 10 or 20 years can have a profound effect on the climate in the second half of this century and in the next." Stern 2007, p. 1.

6. IPCC 2007

7. IPCC 2007, p. 30.

8. IPCC 2007, p. 30.

9. IPCC website, at <http://www.ipcc.ch/organization/organization.htm>. Accessed 12th August 2009.

10. UNFCCC website, at [http://unfccc.int/essential\\_background/convention/items/2627.php](http://unfccc.int/essential_background/convention/items/2627.php). Accessed 12th August 2009.

11. UNFCCC website, at [http://unfccc.int/essential\\_background/convention/items/2627.php](http://unfccc.int/essential_background/convention/items/2627.php). Accessed 12th August 2009.

12. Key facts drawn and in many cases cited directly from IPCC 2007. The author has been cognisant of staying very close to the original IPCC text for the sake of factual accuracy.

13. This means 'caused by human activity'

14. These are the signatories to the UNFCCC, namely Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, European Community, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom, United States of America.

15. Half of all mature tropical forests have been destroyed since 1947, and only 10% are predicted to remain in a pristine condition by 2030. Nielsen, 2006.

16. Mitigation policies are not included in the SRES scenarios (see Nakicenovic, N., Swart, R. (Eds.), 2000. *Special Report on Emissions Scenarios (SRES)*. A special report of Working Group III of the IPCC. Cambridge: Cambridge, UK: University Press).

17. Industrial gold mining is reported to have a carbon footprint of about 12kg / gram. In the estimation of Felix Hruschka, an artisanal gold mining expert, artisanal gold is probably well below 1 kg / gram. IPCC 2007.

18. It should be noted that improving road infrastructure also expedites colonisation and ecosystem destruction as development in the Amazon basin demonstrated in the 1990s.

19. World Bank 2008b.

20. See, for example, USAID 2009, World Bank 2008a, b; <http://www.un.org/climatechange/projectsearch/>;
21. World Bank 2008b.
22. Conversation with development agency strategic manager, April 2009. See also USAID 2009, World Bank 2008a and b.
23. Conversations with industry leaders at the Deutsche Telekom Stakeholder Dialogue Day, 11th May 2009.
24. According to Shaw et al. (2009), and drawing on over a decade of research into behaviour change and planning for sustainable futures, in order to plan suitable and effective responses to climate change, stakeholders must be engaged “throughout the research process to create ownership, accountability, and a willingness to act (UKCP, 2009). In sum, progress towards climate change mitigation and adaptation seems to be more likely if credible information is localized, visualized, and co-constructed (cf. Lorenzoni et al., 2007).”
25. The task force will have to identify the criteria for materiality, but these could include assessing a.) the countries and ASM communities most vulnerable to deleterious climate change impacts and b.) the countries and ASM communities most important to the ASM world (e.g. assessed in accordance with population size, demographics, importance of the deposit to global production, etc.).
26. World Bank 2008b {or a?}
27. E.g. the World Bank has identified the following ASM countries as especially at risk: Ethiopia, Mozambique, Ghana, India, Peru, Bolivia, and others. World Bank 2008b.
28. For example, The World Bank’s project, “The Economics of Adaptation to Climate Change,” work by the Commission on Climate Change and Development (<http://www.ccdcommission.org/>), the Climate Change and Development Roundtable (<http://www.ccdr.org.au/>) and so on.



# Connecting ASM Mines to Markets

Ashton Stewart Carter, Karen Hayes, & Aaron Ziulkowski, Pact with valuable input from Veerle Van Wauwe, Transparence

## Abstract

Direct sourcing, traceability, 'ethical' or 'responsible' supply chains, and pro-poor value chains are popular contemporary topics in the corporate social responsibility (CSR) community and the development dialectic. The idea that markets, retailers and consumers in the developed world can actively participate in addressing the inequities in the

luxury watches and jewelry and of consumer electronics are seeking, and will continue to seek, assurance that the metals and gemstones in their products are sourced from responsible mines. For some this is a defensive strategy to manage reputation and risk; for others, a strategic opportunity to set themselves apart and deepen brand loyalty in their customer base.

This has potential to be a considerable lever for good, yet there are challenges to overcome to the extent that and the speed at which this



*Top left - \$170 worth of ASM diamonds being prepared for shipment along with their Kimberly Process paperwork; Bottom left - several million dollars worth of ASM copper ore ready for processing in the DRC; Right - barrels of ASM mined tin (cassiterite) ore ready for shipment from DRC to Rwanda*

less developed world, is now mainstream. This paper describes this emerging interest and some of the entrepreneurs and first movers who are linking mine to market through direct interventions. We critically examine how this is making and can make a difference in the lives of artisanal and small-scale mining (ASM) communities and consider the possibilities and its growth potential

We tentatively conclude that in some industry segments there is a discernable emerging demand for traceability of mined materials; manufacturers and marketers of

movement can contribute to the development of safe, healthy and economically sustainable ASM. To address these challenges and to promote ASM as a development opportunity in commercial international value chains, rather than dismiss it as a development or corporate risk management issue, efforts must be collaborative, multi-sectoral and strive to build viable business models at all links in the supply chain.

## Introduction

Connecting 'mines to markets' has been the topic of many meetings, panel discussions, papers and initiatives in recent years. It is a catchy phrase, applied to many situations and trading chains. The intention of this paper is to explore specifically how the products of artisanal and small-scale mining (ASM) can enter the mineral value chain transparently and in a way that a greater proportion of value of the traded minerals can be captured by the miners that produce them.<sup>1</sup>

All minerals produced from ASM mines find a path to market. In Africa it is estimated that 40% of all diamonds, 20% of gold, 40% of tin and nearly all colored gemstones are produced artisanally, meaning that an estimated 15% of the entire global minerals market is sourced from ASM. ASM products reach global markets through a wide variety of routes: Minerals are sold to local traders and aggregators who sell them on the spot market or on contract -as ore or after first

formal economy and the potential development benefits which can flow from responsible natural resource extraction, management and trade. ASM minerals and gems are important to the global minerals market, as well as to many communities involved in this economic activity. Yet, there are considerable challenges facing ASM communities in becoming legitimate players in the international trading chain.

### Why ASM mines are currently far removed from the market

Three important factors stand out as being impediments to greater participation of ASM mines in international markets: regular supply of quality product, logistics, and a negative stigma associated with ASM.

Manufacturers require sometimes strict quality specifications which is impossible for most ASM communities to achieve. For example, the Luxury jewelry industry demands gold refined to 99.9 (3 '9's) or 99.99 (4 '9's)

#### Box 1: Email received on June 9, 2009

I am a native of Ashanti region in Ghana. I am contacting you on behalf of my community which comprises mainly of local Gold Dust Miners. My responsibilities are: to source for reliable buyers of our locally Mined Gold Dust AU; represent my people in sales and purchase process; facilitate communication and publicity of our products internationally. Hence, we are sourcing for prospective gold buyers, partners and individuals for the sales of our gold dust as well as establishing more business relationship that will be durable and viable. Thank you for your anticipated co-operation. GOLD DUST; 270 KG; 98% {Non-refined}; 23.1 Karat; Price to be discussed. (REF?)

stage processing - to international traders and processors; they may be sold by ASM miners to large-scale mining (LSM) companies, or on local bourses. They sometimes do and sometimes do not form part of a nation's official exports and statistics; shipments sometimes cross borders and are mixed with the production of another nation and are sold under an assumed provenance; and stones and smaller packages may be smuggled and sold on illegal markets. Visit any number of internet trading websites and it is evident that businessmen and traders continue to seek more direct route to market for ASM gold and other minerals (see Box 1).

However, only a tiny proportion of this material is recognized at the point of sale as coming from ASM sources and the producers, who generally work in hazardous conditions and receive a much reduced price for their products once it has been filtered through many middlemen, are often excluded from the

purity and precious stones must meet a gem quality standard. A regular supply of large quantities of material for the market implies that purchasing from ASM sources directly is too costly and inefficient for the market. ASM may be an inconsistent supply source as many artisanal mines may be located and developed through chance, re-working of old sites, and luck. Thus, without basic geological assessment and mine planning, the resource may be poorly understood and inefficiently exploited, resulting in unreliable levels and quality of production. There is a need then for aggregators, traders and brokers to provide a service to ASM miners by establishing relationships with the market, managing supply and channeling market information back to the mines and processors in the value chain. Too often, however, these middlemen stand between the miners and the market failing to provide the needed

empowering capacity building and taking an unfair and disproportionate share of the value.

The location of mines are often remote from key trading hubs and the transport costs of the minerals can be high. Without basic transport infrastructure and equipment being available, and especially when transporting high volume and weight, the material has to be transported manually, further eating the profit margin for ASM.

ASM is often associated with illegal practices, poor health and safety standards, the use of materials such as mercury, child labor and other aspects that are poorly regarded by enterprises upstream of the mines that are driven to establish clean and responsible supply chain management standards. Some minerals

goods about which the consumer feels strongly (for example: gold or precious stones in jewelry; and tantalum, tin and copper in portable electronics and mobile phones). These demand drivers are strongly connected to awareness-raising by advocacy groups.

### **Shareholder/stakeholder advocacy**

Cause-driven non-governmental organizations (NGOs), investigative journalists, and, increasingly, shareholders put pressure on companies to address social, environmental and governance issues in their supply chains and production. Such lobbies can be very powerful and have resulted in public awareness of ASM through campaigns focusing on 'blood diamonds', 'conflict coltan', and 'dirty gold'.

### **Box 2: Market driver: ASM risk management**

The Africa Trade Insurance Agency (ATI), an insurance underwriter, has provided an innovative new service to assist with ASM access to international mineral markets. In 2007, steps were taken in the DRC to enforce the previously largely ignored legislation that prohibited the export of unprocessed ore. Whilst this did have an immediate impact on reducing the levels of illegal trade, it also put significant pressure on artisanal and small-scale producers who did not have access to processing facilities. In one such case, a UK project sponsor has decided to invest in support small-scale producers to start value-addition. The financier required political risk insurance before they could make this investment and ATI has provided cover for the US\$120,000 project.<sup>1</sup>

are associated with conflict, illegal trade and coercive practices. As such, purchasing ASM material, directly or through its supply chain, can create reputational risks for companies with consumer-facing brands.

However, there are positive drivers to which the market is responding, that promote greater transparency and improved benefit to ASM miners and communities.

### **Drivers for stronger ASM mine to market linkages**

#### **Consumer demand**

In many parts of the world, increased consumer awareness of the sources, social and environmental implications of their purchasing choices is driving market change. In luxury markets, consumers demonstrate an increasing desire to have a deeper brand experience, involving detailed understanding of the product quality, its artisanship, and social and environmental aspects of production.<sup>2</sup> In terms of ASM, consumer awareness is most frequently associated with individual commodities that are tangible and identifiable, or are components in

### **Corporate policies & risk management**

Companies develop ASM policy statements to provide tools and guidance to their in-country operations as to how to deal with ASM issues. The mining industry is in a period of consolidation with a number of mergers and acquisitions resulting in companies unexpectedly in a position to have an ASM policy to govern the practices of new acquisitions, or needing to conform to a corporate policy on ASM of a new parent.

Companies wishing to engage in some way with ASM producers and materials often face various risks in so doing. Some of these are business risks relating to quality, quantity and reliability of supply. Others are reputational risks. Some are operational risks relating to site security and community relations. And still others relate to the political instability in many countries in which ASM occurs. Box 2 describes an innovative new service to respond to this driver.

### **Market opportunities**

In cases where ASM production constitutes a significant percentage of the global market of

### **Box 3: Market driver: Access to ASM sources**

Rand Refinery, which receives all South Africa's newly mined gold and 75% of the rest of Africa's mined gold, is currently looking at sourcing alluvial gold from small-scale mining operations that exist in Africa, with the support of structured mining houses, local governments and communities.<sup>1</sup>

a particular mineral, where ASM may be a more cost-effective way to mine, or where there is a readily available supply which companies wish to purchase, there is a clear business case for companies to find acceptable ways to tap into this source.

#### **Trade and investment standards and regulations**

Industry standards exist in a range of commodities which have implications for ASM. The Responsible Jewellery Council, for example, has specific ASM standards. Beyond individual industries, companies which sign up to initiatives such as the Global Compact, which are required to abide by regulation such as the OECD Guidelines, or which seek investment funding from organizations such as the International Finance Corporation or any of the Equator Principles banks, are obliged to respect certain norms which would dictate responsible practice in any engagement with ASM.

#### **Donor initiatives**

Donors have recently shown a great deal of interest in connecting the poor in developing countries to global markets. USAID currently has enterprise development initiatives in 23 countries helping to build the capacity of businesses within certain industries to compete on international markets. The Gates Foundation currently invests \$109 million in 3 different projects linking rural farmers to markets. One project, implemented by Technoserve, equips farmers in Kenya, Rwanda in Tanzania to grow better quality coffee and access premium coffee markets in Europe and the US with their product.<sup>3</sup> The Gates Foundation recently granted a total of \$48 million to the World Cocoa Foundation and the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH, to improve the livelihoods of cashew and cocoa farmers through improved productivity, crop diversification, and improved supply-chain efficiencies.<sup>4</sup>

### **How the drivers are manifest as market trends**

Direct sourcing, traceability, 'ethical' or 'responsible' supply chains, and pro-poor value chains are popular contemporary topics. Gaining public attention with the entry in 1988 of Max Havelaar coffee, the world's first Fair-Trade company, the idea that markets, retailers and consumers in the developed world can actively participate in addressing the inequities in the less developed world is now mainstream. As the concerns of consumers and voters continue to collide with the interests of investors and businesses, the complex path that minerals, gems and metals take on their way from mine to market is increasingly visible. Businesses are responding to defend their reputation and to exploit market opportunities. The array of responses includes: Fair Trade; responsible supply chains; and ethical boutiques.

#### **Fair trade**

Fair Trade is based on the premise that, by paying a premium, consumers can guarantee that producers in developing countries are paid a fair price and work in decent conditions. Certification organizations like FLO and Transfair ensure that Fair Trade companies meet standards that set a bar for responsible and equitable production and trade. The market for fair trade products grew 1300% from 2000 to 2008, with more than 700 certified fair trade producers selling \$4.08 billion worth of products a year.<sup>5</sup> According to the JustFood Global Market Review, the industry is expected to grow to \$9 billion by 2010, and \$20-25 billion by 2020.<sup>6</sup>

Given the growth in Fair Trade markets, there appears to be great potential for similar mechanisms in mining. The Association for Responsible Mining (ARM), an initiative composed of producers, traders, academics and NGOs established in 2004, is among the first efforts to deal ethically with ASM in global markets. In 2007, the group adapted the Fairtrade Labelling Organisation (FLO) standards to create Standard Zero. Certification aims to assure a path from mine to market, so that consumers can be assured of the minerals provenance, and that workers at every level of the supply chain were paid fairly and subject to decent working conditions. So far, ARM has run pilot projects in several gold mines in South

America, and has plans to launch a product label in 2010.

There might be limits to Fair Trade products having a large scale impact, however. For one, Fair Trade is not for everyone, and it is clear that the biggest markets are not Fair Trade. Also, the Fair Trade movement has grown to be quite a significant force in Europe, while it is significantly smaller in the US, with Fair Trade sales of just \$499 million in 2006.<sup>7</sup> Nevertheless, the Lifestyles of Health and Sustainability (LOHAS) consumer demographic in the US is growing significantly, with an estimated 68 million American adults in 2003 – up 30% from the previous year.<sup>8</sup>

### Responsible supply chains

As the global economy has grown in both its complexity and its interdependence, companies are finding it increasingly important to understand where their goods and services come from, and what standards they are working toward within their supply chain. Responsible supply chains refer to the use of incentives to establish minimum standards across an entire industry. Within the business community,

source their products. Others have joined industry-wide collaborative projects like the Global e-Sustainability Initiative (GESI), the Responsible Jewellery Council (RJC), and the Electronic Industry Citizenship Coalition (EICC). Some multi-stakeholder organizations like the Initiative for Responsible Mining Assurance (IRMA) provide a platform for mining companies, jewelry retailers, NGOs and trade associations to cooperate. Also, government agencies including the UN, Belgian government, and DFID, have recently been involved in traceability initiatives.

Within these initiatives, traceability is seen as a fundamental first-step in establishing responsible supply chains. For example, Wal-Mart uses a system called String, developed by Historic Futures in the UK, to track each piece of jewelry they sell under the Love,Earth® collection. The Kimberly Process certifies a conflict-free supply chain for diamonds. The Electronic Industry Citizenship Coalition (EICC) is currently mapping the electronics supply chain in the Democratic Republic of Congo. When the Eden Project, a sustainable community in Cornwall, decided to use 33 tons of copper for the roof of a building and wanted to make a

#### Box 4: Examples of ethical jewelry brands and retailers

- ▶ Reflective Images uses the FRE System on their website. The FRE System consists of a clickable tab for every item of jewelry the company sells with details of what the item is made of and exactly where its components came from.<sup>1</sup>
- ▶ Fifi Bijoux specifies the particular issues which it avoids and promotes.<sup>1</sup>
- ▶ Harriet Kelsall Jewellery Designs provides information on the Kimberly Process, Fair Trade, and links to inform customers about the issues.
- ▶ John Hardy is takes responsibility a step further with projects on reforestation
- ▶ Cred has a partnership with miners in Colombia's Green Gold «Oro Verde» project and uses Fair Trade standards. " <sup>1</sup>
- ▶ Garavelli is a brand which embraces responsible sourcing with their GLOBO collection. They buy from EcoAndina in Peru.
- ▶ Transparence, an online retail platform, promotes brands who offer 'more than just jewelry'
- ▶ Noen sources gold from EcoAndina and Oro Verde.

there is increasing awareness that sustainable, secure sourcing of all a company's products presents greater value to both the producer and consumer in the long run. However, market fragmentation has made sustainable sourcing more challenging.

Several mechanisms have been created to help establish responsible supply chains. Some companies, such as Wal-Mart and Tiffany & Co. have unilateral initiatives to responsibly

statement about sustainability, it opted to use virgin copper responsibly, traceably sourced by Rio Tinto from its Kennecott mine, rather than using recycled copper or buying on the open market.

Efforts at responsible sourcing are gradually shifting from LSM to ASM. However, potential challenges include limited technology to trace the path of minerals and high transaction costs of batching materials. In order to address these

challenges, cross-sectoral initiatives like the Madison Dialogue have been established to encourage information sharing, coordination and collaboration among companies, civil society groups, and other organizations working to create responsible supply chains.

Some groups specifically target ASM. ITRI (formerly the International Tin Research Institute) states that 97 per cent of the world's tin is produced in developing countries and around half of that has ASM origins. ITRI has developed a policy document as a step towards self-regulation, improving conditions in the supply chain, carrying out due-diligence and possibly implementing tracking systems. ITRI members are committed to the payment of fair, competitive international prices. Members recognize the benefits that can be generated if ASM has access to international markets through legal channels, which in turn contribute to the national economy.<sup>9</sup>

#### **Ethical boutiques**

Ethical boutiques are 'blended value' businesses whose value proposition is linked with the integrated ethical profile of their product. These businesses assume that consumers care about not only the quality and price of the product, but its ethical attributes. Ethical boutiques are often small, catering for a niche market, but frequently making a direct mine to market link.

The ethical jewelry sector also has a vibrant community spirit with numerous blogs and conversations on the internet, as well as trade fairs and publications. For example, Ethical Metalsmiths, an information, advocacy and sourcing website, was formed by two members of the Society of North American Goldsmiths "for the purpose of stimulating demand for responsibly sourced materials ... social responsibility, a healthy environment and materials that are consistent with these values". The site includes a blog where ethical sourcing of gold and other jewelry materials is discussed.<sup>10</sup>

#### **What this means for ASM**

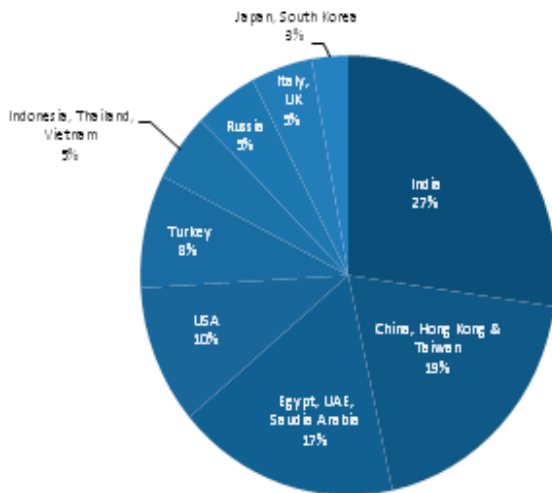
There are initiatives underway that truncate the route from ASM mine to market, to make it more transparent, or to deliver better value to ASM communities. How do these initiatives impact the world's 20 million artisanal and small-scale gold miners? Do these initiatives

and potential alternative routes to market overcome the associated challenges on a sufficiently significant scale to genuinely change the commercial dynamics in favor of ASM? Do they create their own challenges? Are these initiatives what ASM miners want? What could be done to make them more relevant and more effective?

Some of the perspectives that are currently articulated on the challenges associated with these approaches and that will be discussed at the ACC in September 2009, include:

- ▶ Meeting international standards may be expensive, technically challenging, or culturally unacceptable and therefore may not create a viable incentive for ASM communities. Becoming certified to gain access to certain supply chains may be a lengthy process with up-front and annual costs which may be prohibitive for ASM mines.
- ▶ There is a lack of cohesion between standards (green, clean, no child labor, conflict-free, fair trade, etc) which creates mixed messages to the market resulting in confused or complacent consumers. In some instances, there is a cynicism about the various initiatives that exist. Some members of the diamond industry consider that the Kimberley Process was a sufficient initiative to clean up the trade and even that it guarantees a range of ethical standards such as fair trade, etc., so a very specific initiative is quoted as if it had impacts far beyond its actual remit.<sup>11</sup>
- ▶ Some trade initiatives are simplistic solutions to complex problems. For example, the middle-men traders are often castigated as villains and interventions frequently try to exclude them from the mine to market chain. But this fails to recognize the complexity of ASM relationships. Miners often cannot afford to leave the mines to try to get a better price (due to risks and the opportunity cost of mining downtime), so they rely on mine-side traders. Traders can fulfill a variety of important functions in the ASM chain including the provision of basic materials, food and credit; assurance of security; enabling access to mines; payment of formal and informal taxes; access to their network of next tier traders; ability to

**Figure 1: Global Gold Demand in 2008**



absorb price fluctuations through trading in volume and being able to choose the time of their sales in relation to spot prices and currency exchange rates. Miners often don't want to lose their relationship with their trader, even if there are negative aspects such as debt and control issues.

- ▶ Producers of a variety of commodities receive price premiums for ethical or sustainable production. The «Oro Verde» miners receive an income premium of roughly 10 per cent over their peers. Starbucks pays an additional US\$0.05 per pound for production that meets its C.A.F.E. certification standards, and over the past 5 years has paid an average price of \$0.09-0.50 per pound more than New York "C" price.<sup>12</sup> Fairtrade cocoa producers receive a premium of US\$150 per metric ton (.09%).<sup>13</sup> How sustainable are price premiums? A Wall Street Journal study showed that consumers, when presented with both an "ethical" and "unethical" product, would only purchase the unethical product at a substantial discount to an ethical product, indicating that as more and more ethical options are made available, products deemed unethical will become less and less profitable. The same study showed that is a point at which a product is considered ethical enough and after which point consumers don't "reward increasingly levels of ethical production with increasing price premium."<sup>14</sup>
- ▶ Ethical markets are the tip of the iceberg. In 2008, 2,185 tons of gold were used

in jewelry production (of a total global demand of 3,805 tons) representing US\$61b of the total US\$105b market. Only 15% of this demand was in markets which would typically be considered to potentially be interested in ethical sourcing (USA, UK and Italy). The vast majority of demand is in India, China, the Middle East and Turkey with other Asian countries and Russia making up the remainder.<sup>15</sup> (See Figure 1.) In reality, the demand for ethical ASM material remains small. London-based gold analysts GFMS say global sales of ethical gold jewelry are probably less than one per cent of the total gold jewelry market.<sup>16</sup> If the ethical market is to really have impact, it is essential that traders and consumers in India, China, the Middle East, Turkey and Russia become interested.

### Looking forward

Despite these substantial challenges, there are many points of entry, new initiatives and, most importantly, a strong willingness on the part of many actors to find ways to improve the links between ASM mines and markets. This should be considered in terms of demand and supply.

### Greater demand

On the demand side, there is a clear consumer trend towards ethical sourcing which is not only encouraging but is working, albeit with a currently limited sphere of impact. Importantly, the growth in ethical purchasing shows some signs of being 'recession proof'. Volatility is a serious problem for ASM so any market which is more stable is a good thing, especially if it is coupled with long-term procurement contracts. It is reasonable to assume that fair trade, boutique buyers, ethical brands and other such initiatives will continue to gain momentum. This will provide a backbone of success stories, pilot studies, a growing nucleus of dedicated buyers, and the inspirational lead to keep the positive potential of ASM in the public consciousness.

However, the real game-changer in demand occurs when the big players set new standards. This is why initiatives such as the ITRI's efforts to change purchasing across the tin industry in favor of positive ASM, or Rand Refineries' deliberate decision to work towards large-scale

gold purchasing from artisanal and small-scale producers, are so important. Wal-Mart's Love, Earth® collection of responsible jewelry is a case in point. The company (now the largest corporation in the world with annual revenues in excess of \$378b) has already set clean, green, responsible criteria for its jewelry supply chain. However, this has a tendency to filter out ASM rather than bringing it in to the chain. The next step for such companies is to find ways to

ubiquitous and often copied luxury labels and styles.

The combination of increasingly more engaged and technically more empowered consumers worldwide and the trend to purchase goods and services that are more 'personal', 'individual' and 'connected' has huge potential. This is where a realistic and open mind about market segmentation, and an innovative

#### **Box 5: Responsible ASM in 10 Steps**

1. Viable land and resource rights for ASM
2. A supportive and effective regulatory environment
3. Improved security and conflict avoidance/resolution mechanisms
4. Better organization of ASM; training in essential life and business skills
5. Access to finance at all levels
6. Health and safety training; technical training in mining skills; appropriate technology; value added processing
7. Environmental standards and protection
8. Trade incentives and access to markets; fair pricing opportunities; market assurances (such as audit, tracing technology, certification, branding, etc)
9. Social initiatives for vulnerable groups; child protection; gender positivity
10. Community capacity for management of resources, revenues and development

positively engage responsible ASM. This is much harder than doing a clean-up, but ultimately that is how ASM is going to really start being a viable market actor. We need to change the ASM story from one of exploitation to one of potential.

Consumer growth is largest not in liberal-thinking Europe or in the vast US markets where specialist products lines and business models are more mini-mainstream than 'niche', but in China and India, where new capitalists are playing catch up. Eastern businesses and consumers are often accused by governments and campaigners in the West of paying scant attention to the origins and production practices of the luxuries they aspire to and acquire as soon as they have the means. Despite this popular view, recent studies show Chinese consumer attitudes and behaviors are starting to change. Like luxury consumers the world over, China's young and affluent are looking beyond physical and marketing attributes of products (the 'bling' and 'label') and to a chic that is expressed in valued experiences and meaning – in short, a compelling back story that differentiates

approach to identifying champions – be they corporate, celebrity, or others who influence public opinion to think positively about ASM – are needed.

#### **Better supply**

As the market demand grows, it necessitates a rapid growth in the supply of responsibly-produced ASM material to feed it. While not underestimating the effort needed to sway the giants of industry and huge proportions of the global population in terms of demand, making improvements in management practices of the ASM communities and mines to meet market expectations may be an even trickier proposition.

The characteristics of formal, effective, socially and environmentally responsible ASM are known. While not all-encompassing, the attributes of responsible ASM listed in Box 5 synthesize the published principles of the international community of ASM practitioners and representatives. There is an emerging consensus on what actions are needed to help ASM be 'responsible' and play a legitimate role in international markets.



To scale up responsible practices, however, it is critical that: (a) ASM miners, mine owners,



*Sapphire traders in Ilakaka who export directly to India*

and traders see the benefit and are willing to invest the time, effort and resources to fulfill their share of responsibilities on this list; (b) governments are willing to acknowledge the importance of ASM as a responsible livelihood and to put in place the enabling environment for it to work; (c) donors and NGOs are ready to fund and support the necessary interventions; and (d) the private sector sees ASM as a credible business partner, worth investing in and trading with.

Positive examples are essential. Tangible, financial returns must flow early on. Peer exchanges to transmit information about the benefits through the ASM community are invaluable.

Not all mine-to-market arrangements which are improving returns to ASM miners emerge from international or deliberate initiatives. For instance, Ilakaka in Madagascar has direct links to global markets, and most of artisanal gemstones mined in the south of the country are brought there. There are experienced exporters in Ilakaka, who do not need to transfer the product through additional middlemen. There is even (the potential for) direct contact between the miner and exporter, thereby reducing the supply chain to a minimum. These types of examples should be examined to understand how natural market forces are driving innovation and change. (Cartier, 2009)

ASM is, in some cases, moving with the times. As noted in Box 1, internet sales are on the rise. Traders use information technology (teletext, mobile phones, etc) to keep abreast

of international mineral prices and to do deals with their buyers.

### What next?

Because value/supply chains involve multiple actors, multiple drivers and market signals, as well as myriad, complex dynamics at every level, a multi-faceted response is essential if ASM products are to get to market, on a large-scale, in a more transparent, responsible, fair and commercially-viable fashion.

The following high-level elements, by no means exhaustive or systematic list, are proposed to stimulate discussion on what might be needed to create a CASM network program to increase ASM minerals access to, and share of, the global market:

- ▶ A group of CASM members who wish to pilot a number of scalable initiatives to improve ASM mines-to-markets linkages need to agree to work together. A cross-section of actors are needed that include but are not limited to: government, donors, big and small industry, NGOs, local businesses and artisanal mining representatives. Where sectors are under-represented, CASM



*A gold trader in Guinea monitors the international gold price as he trades*

members should commit to bringing their contacts/colleagues/partners on board.

- ▶ The broad objectives and principles need to be agreed and an action plan defined. This should be done as rapidly and non-onerously as possible.
- ▶ A few, large companies need to step up and commit to sourcing a reasonable portion of their minerals from artisanal and small-scale producers. Ideally this would be a couple

of major corporations in both the jewelry industry and the electronics industry. It could be that some smaller actors, less risk-averse and more nimble in action, are needed to show proof of concept.

- ▶ A target needs to be set. A clear point should be agreed when the goods can be delivered to market. The target must be market oriented.
- ▶ Once industry actors say they are ready to buy, the CASM network needs to identify a number of sites where the raw materials could be mined to meet whatever standards are agreed upon. It could be that some meet some sort of certification standard, and some don't. Flexibility is essential.
- ▶ Once the sites are lined up, it will be necessary to assess what it is going to take to get the local business partners, the artisanal and small-scale miners themselves (important not to call them beneficiaries, because they are business partners in this venture) up to speed to meet the demand of the committed buyers. Once the needs are assessed, then support programs or assistance necessary to get them to up to scale must swing into action.
- ▶ Wherever sites are identified, a member of the CASM network must be working on the regulatory environment, including: licensing, rules on processing, exporting, etc.
- ▶ The initiative participants report back at the next ACC.

## Endnotes

1. This paper has been written for the ninth Annual CASM Conference (ACC). It is intended to provoke discussion on important contemporary aspects of ASM and suggested solutions and actions that the CASM network can take to advance its mission. The research needed to formulate conclusions is not complete and further examples need to be included. Consultation to gather input and contributions from stakeholders will be undertaken at the ACC and beyond. The final paper, incorporating these inputs, will be disseminated to CASM in October 2009.
2. Ledbury Research (2008). *Luxury: Considered-Exploring the shift from conspicuous to discerning consumption and what it means for the luxury industry.*
3. Gates Foundation (2009). *Working to Break the Cycle of Hunger and Poverty, Agricultural Development Fact Sheet.* <http://www.gatesfoundation.org/agriculturaldevelopment/Pages/default.aspx>
4. Technoserve to help implement two new Bill and Melinda Gates Foundation-funded projects in West Africa. <http://www.technoserve.org/resources/press-room/2008-2009-press-releases/technoserve-to-help-implement.html>
5. Global Fairtrade sales increase by 22% [http://www.fairtrade.net/single\\_view1.html?&cHash=c2800bf85c&tx\\_ttnews\[backPid\]=614&tx\\_ttnews\[tt\\_news\]=105](http://www.fairtrade.net/single_view1.html?&cHash=c2800bf85c&tx_ttnews[backPid]=614&tx_ttnews[tt_news]=105)
6. Just-Food Global Market Review, 2005
7. Just-Food Global Market Review, 2005
8. Cortese, Amy (2003). *They care about the world (and they shop too).* New York Times, July 20, 2003. [http://www.organicconsumers.org/organic/cultural\\_creatives.cfm](http://www.organicconsumers.org/organic/cultural_creatives.cfm)
9. ITRI Artisanal and Small Scale Mining Policy. V1:15 October 2008
10. [www.ethicalmetalsmiths.org](http://www.ethicalmetalsmiths.org)
11. Marc Choyt, Laurent Cartier on Ethically Sourced Gemstones (April 2008). [www.fairjewelry.org](http://www.fairjewelry.org)
12. <http://www.starbucks.com/sharedplanet/ethicalInternal.aspx?story=pricesAndQuality>. Accessed August 2009.
13. <http://www.fairtrade.net/cocoa.html>. Accessed August 2009.
14. Trundel, Remi and June Cotte (2008). "Does Being Ethical Pay?" Wall Street Journal. Page R1. May 12, 2008.
15. World Gold Council (2009). *Gold Demand Trends May 2009.*
16. Brough, David (2008). "Briton Finds Ethical Jewellery good as gold." Reuters, January 8, 2008.

# Responsible Business Approaches towards Artisanal and Small-Scale Mining: Ensuring Lessons from the Boom for the Time after the Bust

Karen Hayes, Pact; Estelle Levin, Harrison Mitchell and Nicholas Garrett, Resource Consulting Services, Limited

Resource Consulting Services would like to acknowledge the research and writing contribution of Marie Lintzer and Alexander Neumueller to this report

## Introduction

The impact of the economic crisis on responsible business engagement by the private sector with artisanal and small-scale mining (ASM) has been severe. Many projects planned and implemented during the previous boom years, when markets were buoyant and companies were cash-flush, have been cancelled or scaled down in line with other 'non-core' expenditure. This has cast doubt on the sustainability of responsible business approaches which were taken during exceptional mineral market highs.

In light of this, this paper considers some examples where business actors have engaged responsibly with the (ASM) sector during the minerals boom between 2005 and 2008. Two main sets of engagement by business actors with ASM are considered. They are:

- ▶ The trading relationship between artisanal miners and their buyers; and
- ▶ Engagement between ASM actors and other mining businesses. In particular, we consider the relationship between large-scale mining and exploration companies (LSM) and artisanal miners.<sup>1</sup>

The paper then explores how the economic downturn in the latter half of 2008 has since impacted on these market dynamics and boom-time projects, and suggests lessons learned for the sustainable design of responsible business approaches for the time after the bust with a view to achieving more 'shock-proof' and sustainable engagement in the future.

## The boom

### Minerals markets

In the decade 1993 to 2004, the relationship between the London Metals Exchange (LME) stock levels and price was predictable: lower

stocks, higher price. In 2005, a fundamental shift occurred with panic-buying stimulating massively increased prices and investment such that the global market for minerals and metals grew to an incredible peak by 2008. Looking at copper, which is often a good indicator of the market in general, the turning point can be clearly seen as the metal started its infamous march from around \$4,000 per ton to beyond \$8,000 per ton. With escalating energy and raw material demands from the so-called BRIC countries (Brazil, Russia, India and China), particularly the rapid growth in the Chinese economy which sparked fears of supply constraints amongst copper consumers, the boom began in earnest.<sup>2</sup>

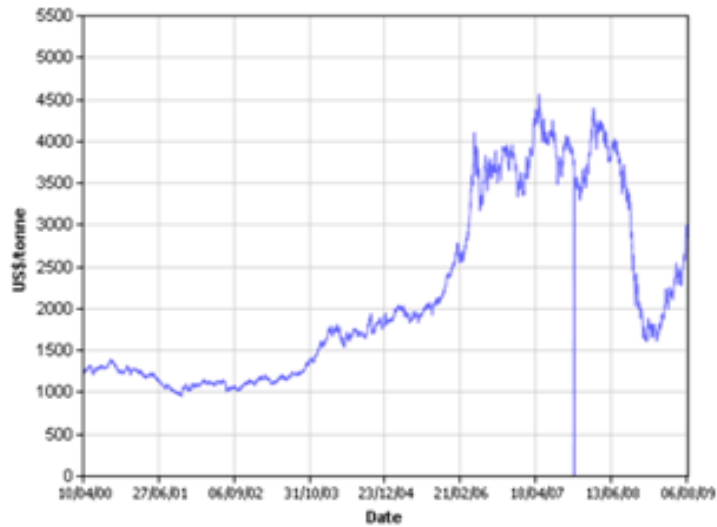
Both large international companies and junior players pushed production to peak levels to keep pace with burgeoning global demand. The pressure to deliver was so intense that many mining companies approved new projects with little regard to the costs of extraction. With prices at record highs, process inefficiency almost came to be seen as a cost of doing business.<sup>3</sup> Profits were enormous nonetheless, allowing buying and mining companies to expand their social investment programmes, including engaging with ASM.

### ASM in the boom

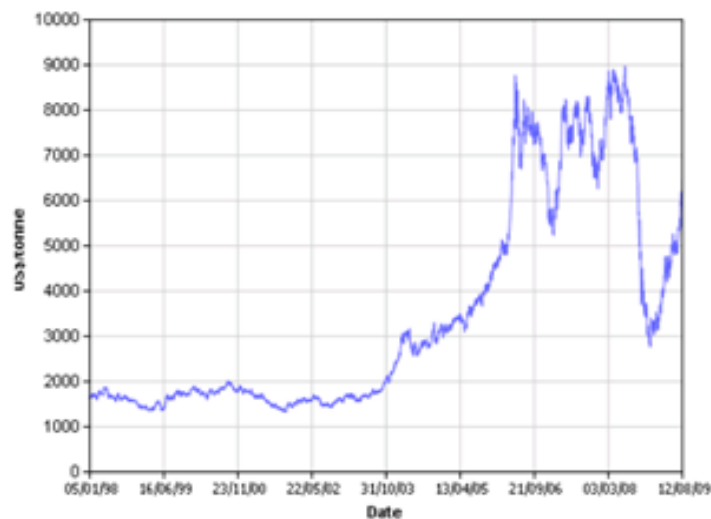
It is estimated that LSM accounts for approximately 85% of the world's non-fuel mineral production with ASM (ranging from purely manual to simple mechanized mining) contributing the remaining 15% of global production.<sup>4</sup> This varies considerably by both location and commodity and, for some minerals, such as coloured gemstones, the proportion mined by artisanal miners is significantly higher (75% according to estimates by UNIDO).<sup>4</sup>

The global mineral price boom had a major impact on ASM communities. Just as prices for LSM-produced minerals increased, so too prices for ASM-generated minerals escalated. In the Katanga Copperbelt in the DRC, miners who were previously dependent on selling their copper and cobalt ore to the State Owned

LMEX price graph.



Copper price graph.



Enterprise (SOE), Gecamines, which was notorious for low prices and a poor track record of payment, suddenly had buyers clamouring for their minerals. Competition drove prices up and the number of miners across the province increased to perhaps 200,000.

Shortages of particular metals create peaks of demand which cannot be met by LSM as production cannot be ramped up quickly but stimulate sudden upsurges of ASM activity which does not require capital investment or long lead times (as was seen with tantalum in 2000/01 when ‘conflict coltan’ from the DRC first appeared in the press).

High commodity prices increase the value of even low-grade or marginal resources and can make ASM more profitable. Increased profitability can make ASM as a livelihood option more attractive. *“The higher prices*

*of gold have made illegal mining become an issue in areas where there wasn’t any problem before,”* according to Olle Ostensson, head of the natural resources section at the United Nations Conference on Trade and Development (UNCTD). *“In Peru, the world’s leading silver producer and the fifth largest producer of gold, a growing number of small-scale farmers have turned to mining. Instead of earning \$1 a day by farming the land, people prefer to earn \$2-3 by standing in a river mining gold.”*<sup>5</sup>

**LSM in the boom**

Global demand for minerals and escalating minerals prices made investment in prospecting and exploration for new mineral deposits a necessary – and lucrative – business for the world’s economy. The annualized growth rate of the global mining industry was 49% from 2003 to 2007. Revenues grew in line with the

### **Box 1: ASM as a livelihood and coping strategy**

ASM takes place in over sixty countries worldwide.<sup>1</sup> Ten years ago, the International Labour Organization (ILO) estimated that there were 13 million people who made their living from manual extraction of minerals, often in illegal or a-legal, dangerous, unregulated conditions.<sup>1</sup> That figure is now more commonly put at 20 million.

A number of factors have induced this increase in dependence on ASM. ASM is a plausible livelihood (whether fulltime, seasonally, or as a supplement) for the most vulnerable as, in its simplest form, it often requires little more than the existence of a mineral deposit, physical strength, and basic tools to deliver a daily income. In certain countries, climatic, economic or political instability have made other livelihoods such as agriculture less viable. At the same time, ASM is also appealing because it can offer high cash returns relative to other livelihoods. As developing countries' economies have become increasingly monetized in the past 50 years, a cash-based income has become increasingly essential for most households if they are to manage their health, education, and housing needs. ASM is thus an important livelihood in rural and peri-urban economies.

In such subsistence economies, access to mineral deposits also provides poor people with an asset with which to establish patron-client relations with more powerful people in their community. Poor people make commitments to sell their findings to their patrons in exchange for ongoing support or incidental financial relief in times of crisis. If access to the mineral is removed, so too might be this exceedingly important coping strategy.

continued strength in commodity prices and increased production, with revenue in 2007 being 3.3 times that of 2002. By 2007, average net profit was 20 times that of 2002, achieving almost linear growth over this time.<sup>6</sup>

Investors were decidedly confident and countries that would previously have been considered an investment risk were high on the list of attractive new properties. In the two year period between 2006-2007 in the DRC, a notoriously risky environment, new mining investments totalled \$2.1 billion and a remarkable 1,653 mining licenses were granted.<sup>7</sup> In Sierra Leone, within five years of the war officially ending, close to 94 per cent of the country had been licensed to large- and small-scale corporate mining ventures, including 99 per cent of the land mined artisanally.<sup>8</sup> Market analysts estimate that the value of mining investment in Africa alone in 2007 was in excess of \$13.5 billion, up 38% from 2006.<sup>9</sup>

At the same time, since the de-nationalization policies of the 1990s, many developing country governments had redrafted their mining laws to encourage foreign investment in their minerals sectors. This included countries with significant ASM sectors such as Peru, Madagascar, Tanzania, DRC, Sierra Leone and Uganda. Thus with strong market demand, buoyant investors, and positive legal developments, LSM activity in developing countries' minerals sectors increased on all fronts.

### **The impact of the boom on LSM / ASM relations**

Whilst much emphasis was necessarily placed on creating a legal framework conducive to LSM, the same emphasis was rarely placed on creating a viable and supportive legal framework for ASM. And even where the legislation was introduced, the practical steps necessary to implement the law in order to create a regulated, safe, efficient and professional ASM sector were largely absent (see Box 2).

When competition between LSM and ASM for mineralized land increases, artisanal miners are typically at a disadvantage in negotiations over land use or entitlements. LSM actors often choose or need to have exclusive access to concessions and tenements, which have been granted to them under mining law and therefore see ASM constituents as illegal occupants of the site. ASM stakeholders, on the other hand, may have little regard for the letter of these new laws. Rather they may have a much stronger sense of their historical right to use their traditional lands and customary laws for the benefit of their families and the local community.<sup>10</sup> Weak society-state contracts in fragile democracies or effective autocracies raise questions as to the legitimacy of decisions made by national-level authorities on the allocation of what these communities see as local mineral resources (regardless of what is in the Law). This creates fraught relations between artisanal miners and their government, as well as any corporate actors who seek claim to land. As a rule, no

## Box 2: ASM under DRC Law

The 2002 Mining Code of the DRC gave legal status to ASM operations under certain, specific conditions and only on government designated ASM Zones. However, to date, only one such Zone has been formally opened and it lacked the essential exploration, mine planning and development which could have made it technically viable. Thus the vast majority of ASM in the DRC is informal and all ASM on LSM concessions is illegal. Over the last five years, and up until the 2008 crisis, there was a massive and rapid investment in mining in the country during which time exploration and exploitation titles were granted to LSM companies even if there were large numbers of ASM workers on site. The majority of companies have had to address this without government support. In Katanga, companies have used a wide variety of methods from forced expulsion of the miners, negotiated compensation, provision of alternatives, or agreed cohabitation. In some cases, this has been achieved peacefully. In others, LSM-ASM tensions have erupted into public demonstrations and fatal violence.

country recognizes any “inventor” right for ASM communities who have had precedence and have exploited the resources long before any cadastre divided their land into mining titles.<sup>11</sup>

These socio-political dynamics set in the context of the mineral price boom led to increased competition between ASM and LSM and resulted in increased numbers of ASM / LSM conflicts. Examples abound. In March 2008, an artisanal miner was shot dead and dozens were injured when police tried to evict them from a site in Kamatanda, Katanga.<sup>12</sup> In the same month, police fired teargas at hundreds of angry artisanal miners, at Luilu, Kolwezi, Katanga, as tensions rose over plans to evict thousands of illegal diggers from private concessions.<sup>13</sup> In 2006 in Bolivia, conflict over access to valuable gold veins erupted into two days of violence when mine employees and cooperative artisanal miners threw dynamite and makeshift bombs at each other leaving 13 dead and over 60 wounded.<sup>14</sup> In 2008 in Guinea, repeated large-scale (upwards of 700 people) mining invasions took place on an LSM mine resulting in damage to property, theft, sabotage and the physical assault of its security personnel.<sup>15</sup>

### Responsible business approaches to ASM during the boom

It was in this context of rising prices, increasing numbers of people dependent on ASM, disenfranchisement of the sector, and escalating tensions between ASM and their stakeholders, that ‘responsible’ business actors had to frame their modes of engagement with ASM with a view to preventing conflict and managing risks whilst improving the commercial and development prospects for both parties.

So what is ‘responsible’ business in the context of this paper? Business relationships can be conducted in ways that produce either

positive or negative outcomes for either party, both in commercial terms as well as with respect to broader social, environmental, and political impacts. In responsible business arrangements, both parties ensure that each benefits as far as possible by giving due consideration to the others’ needs and in a way that minimizes risks to both sides and optimizes on the development possibilities offered by the relationship. Responsible business is about mutual benefit. In the language of corporate responsibility, responsible business is doing business in ways that produces an overall positive impact on society.

This definition is important. For example, the Chinese copper traders operating in Katanga, DRC, during the boom had certain operating traits which made their presence positive for ASM workers (they paid on time, in cash, with no questions asked) but negative from the perspective of efforts to regulate and improve ASM (they were indiscriminate in their sources and had no social investment plans attached to their presence). In the context of this paper, ‘responsible business’ means balancing the needs of the individual miners with the larger cultural changes necessary to develop the sector.

### Buying responsibly from ASM sources

During the boom years, one of the ways that responsible business actors chose to engage with ASM was through trading relationships. LSM companies and mineral traders can and do profit from purchasing ASM materials. This can allow an LSM operation to get into production well before capital investment in mine development and industrial-level extraction. It can also allow a company to benefit from low-cost production in remote areas which would require significant capital investment in infrastructure to access

### **Box 3: Anvil Mining's ASM Purchasing Project from the Kulu River, Kolwezi**

Anvil Mining started the Kulu River Tailings Recovery Project in 2006 amidst significant tensions in the town of Kolwezi and an over-riding need to create employment for the thousands of artisanal miners in the area. The Kulu River project started as a job creation scheme for 250 artisanal miners on a riverbed of tailings left from the old copper processing facility. Anvil employed these artisanal miners to hand-sort material from the river on an easily accessible site which did not require any tunnelling or dangerous practices. Health and safety regulations were put in place and equipment and training were provided.

The number of artisanal miners on the site grew fast, primarily as this was one of the few concessions in Kolwezi which tolerated their presence, also due to the fact that mineral recovery was easier there than on many sites. Anvil also used this as an alternative site for relocating artisanal miners from dangerous sites elsewhere on the concession which were closed, peacefully, through working with the government, UN, civil society and Anvil's social development partner, Pact.

When the scale of the project increased and it was no longer possible to work on the basis of employing people, the company purchased the material at controlled trading points. Anvil worked with the government service for artisanal mining, SAESSCAM, and deducted the official tax to the government from the price paid to the traders. This money was paid into a government bank account. At the peak of the project, Anvil's purchasing program was contributing US\$240,000 in cash per month into the local economy, from March 2006 to March 2008.

Eventually, in 2008, the grade of material in the river decreased and it was necessary to cease the artisanal mining activities. This was carried out as a negotiation with the artisanal miners and traders' committee, the company purchased all the washed material to ensure that the miners did not lose out. The closure of the site to artisanal miners was carried out by the government and Anvil took care to ensure that conflicts were avoided and human rights were respected.

Alongside this project, in partnership with Pact and USAID, Anvil initiated many other initiatives including: job creation schemes for artisanal miners to secure full-time posts with the company; support for the creation of small enterprises including those which could win supply contracts with the company; assistance to the government to explore the development of legal ASM Zones as defined by the DRC Mining Code; support to women who wished to leave ASM to establish new livelihoods such as agriculture; support for a campaign against child labor in the artisanal mines of Kolwezi; and support for HIV/AIDS prevention in the ASM community.

Case study from: Anvil Mining - Finding ways for large-scale mining and artisanal mining to co-exist in the Democratic Republic of Congo (2008)

with machinery. In Uganda, as much as 20% of the production of several large-scale industrial mineral companies is composed of material purchased directly from both legal and illegal ASM.<sup>16</sup> An example of how a responsible buying relationship can deliver mutual benefit is given in Box 2.

By the same principle, a company can benefit by purchasing from ASM exploitation of a sub-industrial resource on their concession which they might otherwise not exploit. In the Philippines, Benguet Corporation has allowed small-scale gold miners to legally mine on the company's property in exchange for exclusive rights to purchase the tailings from gravity concentration. This is also the model that De Beers pursued in the Mwadui mine before market conditions saw the company sell the mine and suspend the project (See Box 3).

A number of other initiatives have been developed to ensure more responsible buying. Often they use the term 'fair trade' to describe

themselves. One such initiative is a buying scheme in Tanzania, by Africa Precious Metals, a subsidiary of the Federal Bank of the Middle East (FBME). APM aims to help formalise gold mining and trading, and to help increase the productivity of the miners through the acquisition of equipment and pre-financing at fair rates.<sup>17</sup> APM has a network of gold buying centres, each of which offers gold purchasing and refining, free internet facilities, microfinance for miners, mobile phone banking services, and free, clean water to community members. APM only buys from legally registered miners, brokers, and dealers. It calls its buying scheme 'Fair Trade' because it follows the highest standards in terms of weighing, assaying, and pricing the gold. APM uses state-of-the art instruments to assay the gold, check its provenance (using 'fingerprinting' technology), and weigh it. The buying counter is set up so that miners can watch their gold being weighed and assayed. The price is based on London fix minus 4-10% to cover

costs and depending on the quantity traded. However, the price is advertised on the basis of units that are locally understood, such as razor blades. The daily price is also advertised in each buying centre and miners can use the internet to research the gold price independently, or do any other activity they wish.<sup>18</sup>

Another such initiative is the Alliance for Responsible Mining's Fair Trade Standard for artisanal gold and associated platinum and silver. This involves not just having requirements for buyers and miners alike to ensure that the trading relationship is fair, but doing capacity building of artisanal miners so that they can price their gold and run their businesses better (among other things). The trading requirements include:<sup>19</sup>

- ▶ The price paid to the Fairtrade mining organisation shall be at least 95% of the London Bullion Market Association fix for gold; the buyer shall also pay a 6% Fairtrade Premium and 9% Ecological Premium, if it applies; the buyer shall pay transport and insurance costs from the point of export;
- ▶ The buyer will provide the miners' organisation with an annual sourcing plan that specifies volumes; the miners' organisation will provide the buyer with its annual production plan; there are clear written agreements between all relevant parties; there will be a contract between the miners' organisation and the buyers specifying minimum and maximum volumes, quality specifications, price and payment conditions, delivery conditions;
- ▶ The buyer must offer pre-financing to miners' organisations with which they have a proven successful relationship, though there is a limit to the amount of pre-financing that is allowed.

Initiatives are not limited to precious metals and the jewellery trade. ITRI (formerly the International Tin Research Institute) states that 97% of the world's tin is produced in developing countries and around half of that has ASM origins. ITRI has developed a policy document as a step towards self regulation, improving conditions in the supply chain, through due diligence and will consider possible tracking systems. ITRI members are committed to the payment of fair, competitive international prices and recognize the benefits that can be

generated if ASM has access to international markets through legal channels which contribute to the national economy. The benefits are manifest not just in mineral revenues but also in employment of artisanal miners, sub-contractors, indirect employees, and suppliers, all of which contributes to growth through the economic multiplier effect.<sup>20</sup>

### **Responsible engagement by LSM with ASM**

Experience in the past decade has shown that LSM which do not adequately engage with the ASM working on or near their concessions may risk escalating their operating and security costs as well as increasing their exposure to risk. Risks can include increased incursions on their concession, theft, violence, occupational health and safety issues, environmental health issues, environmental damage, human rights transgressions, and more. These factors can ultimately affect the bottom line and operational running of a project. In addition, increasing international attention, including in key investment markets, as to how companies address their social and environmental impacts coupled with growing expectations of corporate accountability, has strengthened pressure on LSM to balance the achievements of their commercial objectives with their corporate social responsibilities.

Responsible engagement with ASM at mine site level capitalizes on the socio-economic development opportunities that a mine can offer at the local and national levels whilst delivering the corporate benefits of potential financial gain (or, at least, reduced costs) and reduction of risk. Yet, there are few examples of "sustained coexistence and harmonious relationship between the ASM sector and large-scale operators."<sup>21</sup> For more information on this, the key reference document is the International Finance Corporation (IFC) Comm. Dev, International Council for Mining and Metals (ICMM) and CASM document *Mining Together: A Toolkit for Engagement between Large-Scale Mining and Artisanal and Small-Scale Mining* which was developed in response to these pressures and presents responsible LSM approaches ASM.

Whilst not intending to reproduce the content of the Toolkit, as a result of the boom,



certain areas became particularly relevant and are worth noting:

- ▶ **Security:** Ensuring a conflict avoidance and resolution approach to mine security, which is effective for the mine but sensitive to the community, is essential. For example, the presence of security forces installed to minimize theft can actually profit from it through corruption, resort to inappropriate use of force or firearms, or otherwise create conflict. It is essential that mine security are appropriately trained and sensitized about the importance of conflict avoidance, appropriate use of force, responsible engagement with public security, effective community engagement, and respect for human rights (e.g. in line with the Voluntary Principles on Security and Human Rights).
- ▶ **Displacement and relocation:** The development of large-scale mines can lead to the economic or physical displacement of artisanal miners and their households, which can lead to “long-term hardship and impoverishment for affected persons and communities.”<sup>22</sup> In such cases, the development of a resettlement action plan is essential. This could involve developing alternative livelihoods programmes or creating zones on the concession where the ASM are permitted to mine, along with conditions negotiated between the parties, such as whether or not the ASM must sell to the concession-holder in the first instance and how the price will be established. It could also include doing capacity-building on important issues such as occupational health and safety, and business management to improve the productivity and professionalization of the artisanal mining activities.
- ▶ **Development opportunities:** Through its operations and strategic planning, LSM can contribute to the development of communities which depend on ASM for a livelihood. For example, sourcing food or other materials locally rather than importing it from the exterior can build trust with local communities and strengthen local economies. Seeking to employ local people in jobs such as maintenance and, better, training them to do skilled jobs, can build human capital. Treating mine waste-water to be potable and setting up infrastructure

to deliver this clean drinking water to communities can be a huge contribution. Planning closure with ASM communities to allow them to benefit from mining tailings, where appropriate is another positive step. Above all, identifying, designing and carrying out these development programmes in partnership with local communities, based on their own assessment of their needs in such as way as to ensure their ownership of the program, is an empowering process, making them more able to design and direct their own projects in the future.

### **The bust**

In late 2008, the fallout from the sub-prime mortgage crisis brought the global economy to its knees and caused the biggest shock to financial markets since the 1930s. Investors in US corporations saw their holdings decline in value from more than \$20 trillion dollars in January to \$12 trillion in October 2008.<sup>23</sup> Mining stocks, along with banking stocks, were among those plummeting most quickly. Given that they had enjoyed a significant boom period in the preceding years when the commodities price index rose at 23% pa 2003-07, the fall was all the harder. According to PriceWaterhouseCoopers, 2008 saw the market capitalization of the top 40 mining companies in the world decrease by 62% from 2007.<sup>24</sup> The smaller companies fared even worse with market value losses of more than 90% being commonplace.<sup>25</sup>

### **The impact of the global economic crisis on mining and mineral markets**

The impact of the price collapse varied across different minerals and metals. Base metals have, in some cases, fared better than some other types of minerals. The market for industrial metals has benefited from large government stimulus packages supporting new construction in China, Europe, and the US. Other key price drivers for industrial metals include stockpiling by China, generally strong demand and limited supply, and investment fund activity.<sup>26</sup>

The copper industry was hit hard by the downturn. More than 60 Chinese copper and cobalt mining companies left the mineral-rich Katanga in the Democratic Republic of Congo (DRC). Furthermore, over 100 small Chinese operators are reported to have left Zambian mines.<sup>27</sup> As a policy response to this and other investment flight, Zambia, Africa's

biggest copper producer, did away with a 25% windfall tax on copper to encourage mining companies to continue production.<sup>28</sup> In March 2009, copper inventories in China reached 10-year lows. Because of heightened demand for copper for infrastructure projects, China purchased 478,000 metric tons of copper in May. By June, it had upped its copper imports by 69% compared to 2008.<sup>29</sup> Copper prices began

price of copper currently rests at about 100% above its 12-month low.

The market for diamonds – the archetype of a luxury good and previously considered as a solid sector – has suffered a major blow because of the financial crisis. World prices had been on an upward trend for several years, even in 2008 prices boomed by 12% in the first six months.

#### **Box 4: Engagement with the ASM sector – the Mwadui Community Diamond Partnership**

The Mwadui Community Diamond Partnership (MCDP) was established at the Williamson Diamond Mine, a joint venture between De Beers and the Government of Tanzania, in Mwadui Township. The MCDP was initiated by De Beers primarily because it was the only mine where the company had any significant connection to the local artisanal diamond mining community.

MCDP had two social goals. Firstly, it aimed to develop ASM diamond mining by transforming “the diamond mining and trading business in organised and profitable small scale mining enterprises that operate within the provisions of the mining legislation and that are environmentally acceptable”. Secondly, the projects aimed to contribute to the development of alternative livelihoods activities through organising villages in production groups, providing microfinance and training.

From a corporate perspective the project fulfilled a number of objectives. MCDP was seen as an opportunity to develop an ASM engagement model that could be used in other geographies and through the Diamond Development Initiative (DDI). De Beers realised that failure to engage with ASM stakeholders opened the business up to both reputational and operational risk thus engaging in a long-term and mutually beneficial manner was seen as the best way to mitigate these risks. MCDP intended for the ASM stakeholders to work on parts of the concession which were known to bear diamonds, but not in sufficient quantities to make mechanised operations profitable. Thus, diamonds which otherwise would not be recovered were also able to benefit the local community. And finally, the success of the ambitious MCDP project would likely contribute to De Beers’ CSR profile.

The designers at De Beers emphasised the need for the project to be profitable in the medium to long term and would have been discontinued if it failed to meet this criteria. The start-up costs of the project were significant at US\$2m, although much of this was R&D costs that are part of a first time project and would be saved on subsequent projects, it is unlikely that this cost would be recovered through ASM production.

A number of multi-stakeholder partnerships to formalise and support ASM, and thereby to help alleviate poverty and accelerate sustainable socio-economic development in surrounding communities, were put in place.

The project faced a number of challenges. Actions could only be undertaken with the Tanzanian government, which resulted in a distinct mix of challenges due to the often ineffective state of governmental-led initiatives. One fundamental issue was the legal status of ASM diamond mining activities being undertaken within LSM leases. A second legal issue was that of the management of the Mwadui township as, under the Mining Act, 1998, only infrastructure supporting mining activities can be erected within the mining lease. Additionally, the successful implementation of the MCDP was reliant on the viability of the WDL as a core business, with the stimulation of alternative livelihoods intended to take place through the establishment of a Mwadui Savings and Credit Cooperative Organization. De Beers was not able to guarantee these elements which resulted in raised expectations with limited chances of their fulfilment.

The successful implementation of the MCDP was suspended in advance of the sale of the Williamson mine to Petra Diamonds in December 2008. While De Beers has stated that it remains committed to assisting with implementation of the program by offering practical advice to both Petra and the GRT, the future of the project is uncertain. While it should be noted that the Williamson mine was a marginal mine for the company already, the sale leads to questions about the sustainability of the project, particularly where buyers are unwilling or not legally obliged to maintain the relationship.

to turn around in early March 2009, and have continued increasing steadily since then. The

But they then plummeted by 50% from October 2008 to March 2009.<sup>30</sup> In July 2009, De Beers, which produced 54% of global production by

value in 2008, reported that sales fell by 54% to \$1.7 billion and registered operating losses of \$164m as opposed to underlying earnings of \$350m a year ago.<sup>31</sup> Debswana, the largest diamond miner in the world, decided to completely halt production. Reduced consumer demand, high stocks of both rough and polished diamonds, high levels of debt, and low liquidity have severely impacted all levels and scales of activity of diamond mining. Corporate mines of all sizes in Canada, Australia, and Southern and West Africa have been moved into maintenance or production stopped altogether. Prices have declined between 7-15% since last year.<sup>32</sup> Things look even worse than in previous downturns: in the recession of 1980-1983, global diamond production fell by less than 5%.<sup>32</sup> Analysts are projecting a potential 30-40% market contraction this year.<sup>33</sup> Analysts are projecting a potential 30-40% market contraction this year.<sup>34</sup>

Precious metals have mixed uses; gold can be both an investment and a luxury item when made into jewellery, while platinum can be used for jewellery or as an investment, but is principally used in the manufacture of automobile emissions control devices. On the whole, precious metals have fared well in the downturn with the price of gold being less affected by the economic crisis than was expected. Gold is seen as an investment vehicle, a hedge against inflation and the weakening dollar, and a last refuge in times of economic uncertainty. It was a surprise, then, that as the market collapsed in October of 2008, gold prices fell simultaneously. Then, in late February as the Standard and Poor 500 Index hit a new low, gold rallied. These confusing signs continue. The value of gold has not grown significantly, nor has it lost significant value since the beginning of the crisis. As of early August 2009, gold is up 5%, while the S&P500 is down about 30% year-on-year. Institutional investors and central banks, particularly in Russia and China, have stocked up on gold. From January to July of 2009, the US Mint sold 756,500 ounces of gold, three times more than it had at the same point during the previous year.<sup>35</sup> Analysts predict that while demand for fabricated luxury items like jewellery will drop significantly, large government bailouts will put inflationary pressures on currencies and will continue to make gold appear to be an attractive investment. If investors respond to inflation as they have in the past, it could spell

significant returns on gold. In fact, in the five years since WWII with the highest inflation, the average return on gold was 130.4% per year.<sup>36</sup>

Shutdowns, delays, and cutbacks have a broader impact through job losses both in mining and in all associated service and supply industries. From November 2008 to March 2009, 8,000 mineworkers in Peru lost their jobs.<sup>37</sup> Over 3,000 Zambian mineworkers from just three mines lost their jobs in January 2009.<sup>38</sup> In the same month, BHP Billiton retrenched 6,000 workers at the Escondida mine in Chile, the largest copper mine in the world.<sup>39</sup> Industries directly dependent on mining suffered too with an estimated 500,000 Indian diamond processors laid off.<sup>40</sup> It is likely that these retrenchments in the mining industry could compound the level of poverty in developing countries owing to the high number of dependants living on a single mineworker's salary.<sup>41</sup> While mining employment is anticipated to increase in all countries after 2010 when the global markets are expected to improve, the rate of re-recruitment will likely be slow.

With such an important proportion of global mining production coming from ASM, and so many people dependent on this livelihood, it is inevitable that the ASM sector was also impacted by the dynamics of the economic crisis. The fall in prices of base metals led to a significant hit to prices received by artisanal miners. The negative effects of the global economic crisis on copper production were highly visible and publicized, especially in the Congo/Zambia Copperbelt, with firms scaling down, temporarily stopping production, closing down (sometimes overnight), and postponing planned production or investment plans. Just as jobs were lost in LSM, the ASM market for copper and cobalt collapsed and artisanal miners were economically set adrift. Victor Kasango, Deputy Mines Minister, estimated that perhaps 300,000 mine workers in the formal and informal sectors lost their livelihoods in the latter half of 2008.<sup>42</sup>

The artisanal diamond sector comprises some 1.5 million ASM workers, predominantly in Sub-Saharan Africa, but also in Indonesia, China, India, Brazil, Guyana, and Venezuela. The impact on the miners has been profound: mine owners have left, often suddenly, and their workers have been abandoned; independent subsistence miners cannot sell their diamonds or afford their inputs; and mechanics, farmers,

and shop-keepers who provide goods and services to the industry, are all finding it harder to make ends meet. Interviews at the height of the mining season in April in Kono, Sierra Leone's traditional diamond heartland, revealed that with few people buying diamonds, fewer are mining them and so people are migrating away from the diamond areas either to the gold mining regions or other urban centres, or are moving back to their traditional regions to farm. Many young people who were engaged in ASM diamond mining in Angola are reported to have abandoned the job because there are no buyers and the stones have become almost worthless. Most of these youth have moved to the Angola-DRC border to do business and there is a fear that tensions may rise as people in both countries struggle for scarce space, opportunities and resources.<sup>43</sup>

In some areas, the fall in base metal and diamond prices led to a migration toward more stable metals such as gold. Gold is one of the most important foci for ASM globally. In 2004, the Global Mercury Project estimated that there were between 10 and 15 million artisanal gold miners worldwide, including 4 million women and nearly one million children.<sup>44</sup> While gold was not immune to the global crisis, it has weathered the storm far better than many other minerals and remains a viable sector for artisanal miners. In similar circumstances to the diamond-now-gold miners of Sierra Leone, many ASM gold miners (or *orpailleurs*) interviewed in the Mambasa area of Province Orientale in DRC in June 2009 had migrated from the tin and tantalum (*coltan*) mines of Eastern DRC due to a combination of the insecurity in the region and the low prices of these minerals compared to gold.

#### **The impact on business engagement with ASM**

It is increasingly recognized that the economic crisis is negatively impacting developing countries, especially those dependent on the mining sector for revenue.<sup>45</sup> Southern Africa Research Watch (SARW) notes that the following impacts on the mining sector in some Southern African countries: decline in mining production and regional output; increased job losses in the sector; potential social consequences of the decline in mining sector; increased social tensions; growing frustration with governments' inability to effectively deal with the crisis; and

pressure on local empowerment initiatives to diversify from mining.<sup>46</sup> Their report predicts that inflation, reduced public expenditures and a reduction of GDP may all contribute to increasing poverty.<sup>47</sup>

As well as having a direct affect on the livelihoods of LSM and ASM miners, the downturn is also affecting mineral economies on a country level and therefore impacting the national context in which they live and work. For example, ASM accounted for over half Rwanda's domestic mineral production in 2008, but targets from the country's mining industry are expected to drop by 35%-40% due to the global financial crisis.<sup>48</sup> Coupled with this, many artisanal producer nations are extremely poor and politically fragile, and with some having come out of civil wars in the last decade, the consequences of the downturn and the deleterious effect this could have on financial, and hence social, stability could be even more far reaching.

Plus it is not just the downturn, which is the problem. Commodity price volatility is a major issue for commodity-dependent countries and producers including countries where ASM minerals are a major part of the economy. Clearly, low commodity prices will result in lower incomes for producers and fewer jobs for workers, but volatile prices also have a negative effect on livelihoods as they make national financial management impossible. Coupled with this, prices for primary commodities have been falling relative to the prices of manufactured goods, making it increasingly expensive to invest in technology and purchase other finished goods. Since the turn of the millennium, the risks facing commodity producers have been partially disguised by strong prices for certain commodities but, as the bust has shown, such high prices are transient. Commodity producers are, in effect, running to stay still.<sup>49</sup>

From the perspective of the majority of ASM purchasing schemes, it would appear that, as the prices fell, a significant proportion of them simply shut down. Karen Hayes, then Program Director of Pact Congo, reported that: *"In September 2008, in Kolwezi, there were 40 copper buyers. Then, at the end of November 2008, there were only two buyers"*.<sup>50</sup> One buyer had a dedicated budget with which to clean up on cheap copper and to stockpile it until the price increased, the other would not touch

copper, only cobalt. The diggers were going to ever more dangerous sites to find cobalt for this sole buyer.

Contrary to trends in the luxury jewellery markets generally, the major supplier of pre-certified Fairtrade gold to British jewellers reported an overall increase in demand for their precious metals. In turn, this has enabled them to increase their orders of gold from the pre-certified Fairtrade producers.<sup>51</sup>

In terms of responsible LSM engagement with ASM, many companies, faced with dwindling markets and rising operational costs, simply had to cut back on all their non-core activities. Cost management was pushed to the top of the corporate agenda – not only as a way to offset softening commodity prices, but also in response to ongoing high costs for development, materials and labour.<sup>52</sup> For many this has meant shelving or reducing to a very minimum their CSR projects including their ASM activities. This was a substantial shock to many communities. When mineral prices were good, new mines were built in a hurry and host communities benefitted from a jump in jobs, infusions of cash, and investment in infrastructure. However, when prices fell, production slowed and some mines closed altogether. Communities suddenly found themselves facing unemployment, loss of income and a declining population.<sup>53</sup>

## Conclusions

Mining is a long-term operation and industry within which the cycle of boom and bust is a regular feature. Despite this, economic downturns, commodity collapses and other financial shocks can dent the industry's rate of growth or claim individual corporate victims, as it has in previous downturns. Analysts are divided as to how long this recovery will take. Some anticipate that market valuations of the larger mining companies will remain at a fraction of their peak levels and the climate will continue to be exceedingly difficult for the mining industry until 2010.<sup>54</sup> Others say a sharp

reduction in inventories and a bias in global stimulus packages toward metals-intensive infrastructure spending around the world may combine to create a new supply/demand imbalance, pushing up metal prices and deal values. Ernst & Young report that *“Two to three trillion US dollars in economic stimulus packages have been announced around the world over the last few months, and it's estimated that 30-40% of this will be going into infrastructure. More than 70% of the package planned by China alone is set to be in metals-intensive infrastructure spending.”*<sup>55</sup>

If we look at the markets today, the price of copper is back to a 12-month high, though analysts warn that this is not yet a reliable trend, rather a peak of optimism: *“gains were built on the quicksand of sentiment and could prove short-lived”*. There is potential for another price crash in copper.<sup>56</sup>

In line with the industry's 12 month stockpile of polished diamonds as of October 2008, the downturn in demand for rough diamonds is expected to last at least one to two years from that date. In July 2009, Unity Marketing reported renewed confidence amongst wealthy Americans, suggesting that the markets for luxury goods are likely to recover in the next year.<sup>57</sup>

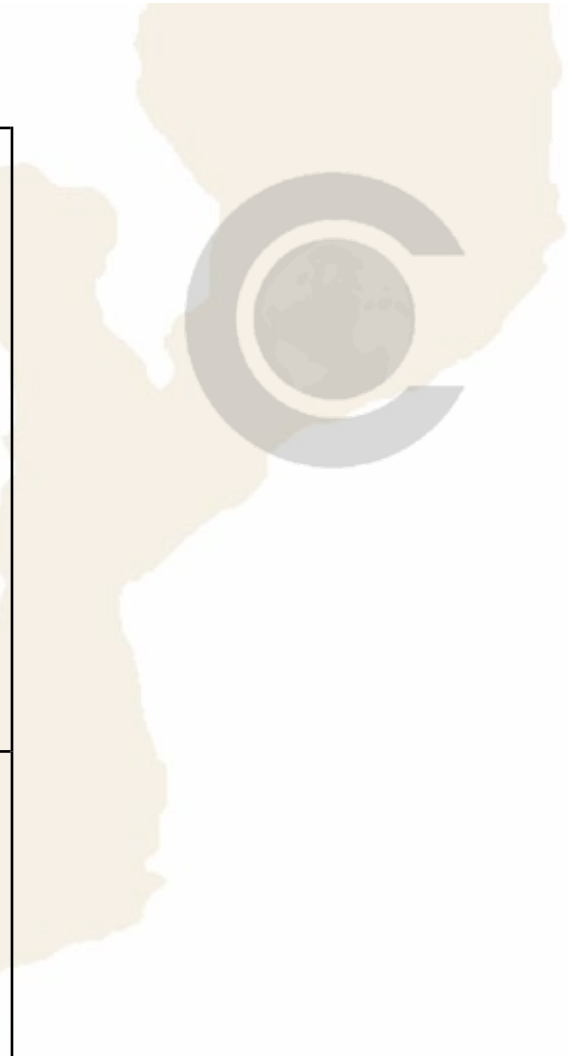
In the longer term industry analysts predict that there will be a sustained shortfall of diamonds, mainly due to increasing demand in Asia's booming economies, which will prop up prices once again and stimulate growth.

So what does this mean for ASM? Some observations can be made based on reported trends. In the following table we seek to present:

- ▶ Some observed trends
- ▶ Relevant lessons learned from the boom and bust
- ▶ Recommendations, based on these lessons, of how to capitalize on the opportunity, and/or mitigate the risks and negative impacts, of these trends.

Observed trend in mining and the minerals market	ASM-related lessons and observations from the boom and bust	Recommendations: How to capitalize on the opportunity and/or mitigate the risks
<p><b>Access to equity and debt has dried up</b> for many small-to mid-capitalization mining companies. Those with portfolios that are at the development stage or that are not sufficiently revenue generating may have to sell assets to survive.<sup>58</sup> There may be a backlash against the maverick spirit which led many juniors to enter complex markets in Africa and elsewhere in the developing world when the industry was cash-flush. This may mean less or slower LSM entry to developing country mining sectors where ASM is prevalent.</p>	<p>During the boom, adjustments to mining codes in favour of foreign investment and industrialisation did not adequately address the needs of artisanal miners.</p>	<p>Consultation on development of the law, and incorporation of structures and regulations that enable the formalisation and professionalization of ASM are vital for minimising the risk of conflict and ensuring countries' mineral deposits can be optimally exploited in line with local and national development interests. The relative lull in mining activity provides an opportunity to revisit ASM legislation.</p>
<p>Sites which LSM actors had obtained during the boom were frequently abandoned during the bust. This has created <b>new sites where nimble and opportunistic ASM can re-start activities</b> while the slower LSM actors go through the processes of corporate decision making, recruitment, and the logistics of getting back to site. In some cases, these are new sites which were not previously accessible to ASM which are now very attractive. In some cases, they were sites of LSM-ASM conflict and the negotiation process may need to start all over again. There is potential for new flare-ups in LSM-ASM conflicts.</p>	<p>The entry of LSM into areas where ASM was prevalent frequently caused displacement of ASM and conflicts, some of which were, and more of which could have been, avoided. Many useful lessons were learned by companies who had to evacuate diggers from sites in a peaceful and socially/ economically acceptable fashion.</p>	<p>Conflict-sensitive approaches to LSM-ASM relations were developed by responsible companies. These approaches need to be communicated across the LSM sector, not just through passive media but through exchange visits and practical training workshops which include both LSM and ASM participants.</p>
<p>The boom created jobs for communities, including artisanal miners, in all stages of LSM. With the massive redundancies that were associated with the downturn, many of the newly trained and employed workers were destitute and unable to find jobs in the sector and so may have left the mining areas (as they could not even return to artisanal mining as this was equally depressed). This <b>represents a massive loss of human capital and a real blow to the efforts which were made to assist artisanal miners to transfer into the formal sector.</b></p>	<p>When offered potential employment in LSM, many ASM workers were eager to transfer into the formal economy.</p>	<p>Training artisanal miners in transferable skills (e.g. business and financial management, occupational and environmental health, environmental protection and management, organisational strengthening and good governance) will not only improve their mining, but will increase their resilience to economic crisis in minerals markets by making it easier for them to shift into other sectors.</p>
<p>The <b>likely continuing strength and relative stability of gold</b> will mean that this precious metal will continue to provide a livelihood for ASM for the foreseeable future. Its attractiveness over other minerals has stimulated in-migration to gold areas with the related risks of conflict, increased burden on resources and infrastructure, etc. It may also signal a continued and possibly increased need for gold LSM companies (who now comprise 26% of the total market capitalization, more than double the 2007 level<sup>59</sup>) to focus on their ASM engagement strategies. A very interesting new market dynamic from the ASM perspective is that Rand Refinery, which receives all South Africa's newly mined gold and 75% of the rest of Africa's mined gold, is currently looking at sourcing alluvial gold from small-scale mining operations that exist in Africa, with the support of structured mining houses, local governments and communities.<sup>60</sup></p>	<p>Gold is a refuge for artisanal miners, as well as international investors. As such, artisanal gold mining communities may provide useful hubs for training miners in responsible mining techniques, to encourage dissemination of this awareness and these techniques to other mining communities after the bust.</p>	<p>Efforts of the gold industry to engage with ASM in a responsible manner should be supported, especially where such efforts stem from large companies with potential for significant impact.</p>

Observed trend in mining and the minerals market	ASM-related lessons and observations from the boom and bust	Recommendations: How to capitalize on the opportunity and/or mitigate the risks
<p>The U.S. National Mining Association, in commenting on the Mercury Export Ban Act of 2007 considered that the high market prices for precious metals may increase artisanal use of mercury, even if mercury prices also increase. They postulated that even if mercury prices are forced high enough so that mercury would be out of artisanal miners' reach, there is no assurance that miners would choose safer technology. One possibility is that artisanal miners would mine the mercury directly. Another possibility of concern is <b>the increased use of cyanide by artisanal miners who do not have the expertise to handle it in an environmentally sound manner.</b><sup>61</sup></p> <p>Deloitte's note in their Top 10 Trends for the mining industry is that for countries dependent on mining royalties to bolster national revenue, <b>slower production may lead to greater instability as governments grapple for additional revenue sources.</b> This may increase governments' interest in formalizing and taxing artisanal mineral supply chains.</p> <p>Whilst <b>corporate social investment may be a temporary casualty of the economic crisis</b>, industry standards, investor requirements, and the practical realities of needing to secure a 'social license to operate' will ensure that social programs return to the corporate budget within a reasonably short time.</p> <p><b>China, and other emerging super-economies, will continue to grow and demand minerals.</b> What purchasing standards these buyers will apply remains to be seen. At present, there is little indication of socially-conscious mineral purchasing in these markets but this may change, especially as downstream users, such as construction and electronics companies, increase demands for transparent and sustainable supply chains.</p>	<p>As above.</p> <p>In certain situations, notably where responsible LSM buyers engaged with ASM purchasing, the payment of ASM taxes was incorporated into the program.</p> <p>LSM and mineral buyers are important partners in bringing sustainable development to artisanal mining communities, or not.</p> <p>Chinese and other buyers are important new and powerful actors on the ASM market. Their cash-input into ASM communities is important. However their buying practices can also stimulate, exacerbate or perpetuate social problems associated with ASM such as child labour, mining of radioactive material, etc.</p>	<p>Support for mercury management and eradication programmes, such as the GMP, must be continued and increased.</p> <p>Clear mandates, training, audit systems, a functioning and paid civil service, and system capacity are all essential if ASM taxation is to be effective. Simple programs which disseminate official ASM taxation can reduce corruption and extortion around ASM sites.</p> <p>Research and decision-making must be done with and not for ASM communities if programmes are to be effective. Participatory approaches to programme design and implementation also build human capital and contribute to development in and of themselves.</p> <p>Despite the challenges, entry points to engage with Chinese and other buyers must be made. This could include through Embassies (as many Chinese buyers are state representatives) as well as through Chinese business networks.</p>



## Endnotes

1. Ernst & Young, (2009). "Mining & Metals in Adversity."
2. Deloitte. (2009). "Tracking the Trends 2009 - The top 10 global mining issues." [http://www.ey.com/Publication/vwLUAssets/Mining\\_and\\_metals\\_in\\_adversity/\\$FILE/EY\\_Mining\\_and\\_metals\\_in\\_adversity.pdf](http://www.ey.com/Publication/vwLUAssets/Mining_and_metals_in_adversity/$FILE/EY_Mining_and_metals_in_adversity.pdf)
3. WEBER-FAHR, Monika, STRONGMAN, John E., KUNANAYAGAM Ramani, MCMAHON, Gary & SHELDON, Christopher, (2003). "Mining." Macroeconomic & Sectoral Approaches, Volume 2, Chapter 25, World Bank.
4. UNIDO, (2002). "Final Proposal: Removal of Barriers to the Introduction of Cleaner Artisanal Gold Mining and Extraction Technologies." Project
5. Number GLO/01/G34, 86p
6. High Gold Price Swells Ranks Of Illegal Miners: Poor Men And Women In Ghana, Ex-Militia Fighters In Steamy Eastern Congo And Farmers In Peru Are Among Those Joining The Ranks Of Illegal Miners And Risking Their Lives As They Seek To Profit From Soaring Gold Prices. July 15, 2008 <http://www.canada.com/victoriatimescolonist/news/story.html?id=079bb40a-fa86-4cea-a149-56dae4efc3d3>
7. PriceWaterhouseCoopers, (2009). Mine\*As good as it gets? Review of global trends in the mining industry 2008.
8. Cuvelier, Jeroen, (2009). Impact of the Global Financial Crisis on Mining in Katanga, IPIS
9. Le Billon, P. and E. Levin (2009) "Building Peace with Conflict Diamonds? Merging Security and Development in Sierra Leone" in *Development and Change*, 40(4), 693-715.
10. PriceWaterhouseCoopers (2008). Mining Deals 2007 Annual Review
11. Aubynn, A. (2009). "Sustainable solution or a marriage of inconvenience? The coexistence of large-scale mining and artisanal and small-scale mining on the Abosso Goldfields concession in Western Ghana." *Resources Policy* 34 (2009) 64–70
12. CommDev (April 2008). Mining together, Large-Scale Mining meets Artisanal Mining: A framework for action, p.8 (2nd draft) p.10
13. <http://news.bbc.co.uk/2/hi/africa/7283029.stm>
14. <http://www.reuters.com/article/rbssIndustryMaterialsUtilitiesNews/idUSL3191292220080331>
15. <http://www.minesandcommunities.org/article.php?a=2596>
16. <http://www.anglogold.com/subwebs/informationforinvestors/reports08/ReportToSociety08/p/c/review.htm>
17. CommDev (April 2008). Mining together, Large-Scale Mining meets Artisanal Mining: A framework for action. p.8 (2nd draft) p.11
18. Interview with FBME manager, November 2007.
19. Based on field research done by Estelle Levin in November 2007 as part of the Alliance for Responsible Mining's Scoping Study for Fairtrade-certified gold pilot projects in Tanzania.
20. FLO: Standard for Artisanal and Small-scale Mining of Gold and Associated Metals, ARM: Standard Zero for Gold and Associated Silver and Platinum, 2009, draft for consultation released August 2009. See [www.communitymining.org](http://www.communitymining.org).
21. ITRI Artisanal and Small Scale Mining Policy. V1:15 October 2008
22. MCDP, Mwadui Community Diamond Partnership Report & Request for Guidance from the WDL Board (June 2008) p.3
23. IFC (2006). Performance Standard 5: Land Acquisition and Involuntary Resettlement.
24. Wall Street Journal (2008). October 11, 2008, pg. 1.
25. PriceWaterhouseCoopers, (2009). Mine\*As good as it gets? Review of global trends in the mining industry 2008.
26. Ernst & Young, (2009). "Mining & Metals in Adversity."
27. O'Connell, Rhona (2009)."Chinese boost for base metals to cool." GFMS, Mineweb.com
28. Southern Africa Resource Watch (2009). "Impact of the Global Financial Crisis on Mining in Southern Africa."
29. Shacinda, Shapi (2009). "Zambia abolishes 25 pct windfall mining tax." Reuters
30. Morning, Zhou (2009) "China copper imports jump as prices soar 80% this year." Marketwatch.com
31. Derby, R. and C. Lourens (2009). "De Beers Funding may be 'Hard Sell' for Anglo", 23rd July 2009, in Bloomberg.com at <http://www.bloomberg.com/apps/news?pid=20601116&sid=aul3m7X1DYFk>. Accessed 6th August, 2009.
32. Rapaport TradeWire, 31st July 2009; 2008 production figure from De Beers (2008) Report to Society 2008. Living up to diamonds: From natural resources to shared national wealth.
33. Sergeant, Barry (2009). "Diamond sales truly collapse." Mineweb.com
34. Sergeant, Barry (2009). "Diamond sales truly collapse." Mineweb.com
35. Blenkinsop, Philip (2009). "Indebted diamond sector set for shakeout as demand collapses." Reuters
36. Blanchard & Co. (2009). "Indicators suggest gold poised for big breakout by end Q3." Mineweb.com.
37. Blanchard & Co. (2009). "Indicators suggest gold poised for big breakout by end Q3." Mineweb.com.
38. Datos de la Federación Nacional de Trabajadores Mineros, Metalúrgicos y Siderúrgicos del Perú (FNTMMSP), 27.01.2009
39. Lusaka Times (2009). "Over 3,000 Miners Laid Off." Lusaka Times, 23 January 2009. <http://www.lusakatimes.com/?p=7708> .
40. Farias, Manuel (2009). "BHP to revise delayed Escondida expansion project if copper price recovery sustained." Reuters
41. Blenkinsop, Philip (2009). "Indebted diamond sector set for shakeout as demand collapses," Reuters.
42. Southern Africa Resource Watch (2009). "Impact of the Global Financial Crisis on Mining in Southern Africa"
43. AFROL News (2008). "Mining Crisis in DRC's Katanga Province." December 2008.
44. CommDev (2009). "CSR: Good for Business Even in a Recession."
45. Chouinard, R. & M. Veiga (2008). Results of the Awareness Campaign and Technology Demonstration for Artisanal Miners: Summary Report. Published by UNIDO.



46. Danny Cassimon and Karel Verbeke (2009). Development Cooperation addresses the Impact of the Financial and Economic Crisis in Low-Income African Countries, Case Study Democratic Republic of the Congo, Version May 2009, p.2.
47. Southern Africa Resource Watch (2009). "Impact of the Global Financial Crisis on Mining in Southern Africa"
48. Danny Cassimon and Karel Verbeke (2009). Development Cooperation addresses the Impact of the Financial and Economic Crisis in Low-Income African Countries, Case Study Democratic Republic of the Congo, Version May 2009, p.19.
49. Moses Gahigi (2009). "Gov't eyes artisanal mining", The New Times, 6 August 2009.
50. Brown, Oli, Alec Crawford and Jason Gibson (2008). Boom or Bust: How commodity price volatility impedes poverty reduction, and what to do about it. International Institute for Sustainable Development 2008.
51. Beth Shirley (2009). "NGO engages with corporate partners over illegal mining." Miningweekling.com, 16 January 2009.
52. Telephone interview with Greg Valerio, 10th August 2009.
53. Deloitte. (2009). "Tracking the Trends 2009 - The top 10 global mining issues."
54. Doukas, Alex, Alison Cretney, and Jaisel Vadgama (2008). Boom to Bust; Social and Cultural Impacts of the Mining Cycle. After the gold rush. Feb 2008.
55. Southern Africa Resource Watch (2009). "Impact of the Global Financial Crisis on Mining in Southern Africa"
56. Ernst & Young (2009). "Mining & Metals in Adversity."
57. Desai, Pratima and Michael Taylor. "METALS-Copper rallies to 10-1/2-mth peak, scepticism grows". Reuters August 13, 2009.
58. Marketwire (2009). "Unity Marketing's Latest survey of Affluent Consumers points to Signs that the Luxury Consumers are Beginning to Recover from the Recession." 24th July 2009 at <http://www.marketwire.com/press-release/Unity-Marketing-1021762.html>. Accessed 6th August, 2009.
59. PriceWaterhouseCoopers, 2009. Mining Deals 2008 Review: Mergers and acquisitions activity in the mining industry.
60. PriceWaterhouseCoopers, (2009). Mine\*As good as it gets? Review of global trends in the mining industry 2008.
61. Holman, Jacqueline (2009). "Refinery sources 40% of business from outside SA.", 20 Feb 2009, Mining Weekly <http://www.miningweekly.com/article/refinery-sources-40-of-business-from-outside-sa-2009-02-20>.
62. Comments of the National Mining Association on the Mercury Export Ban Act of 2007 (H.R. 1534). Submitted to the Subcommittee on Environment and Hazardous Materials Committee on Energy and Commerce, United States House of Representatives, June 29, 2007.



# Certification and Artisanal and Small-Scale Mining

Christopher Sheldon, Lead Mining Specialist, World Bank with a contribution from Gudren Franken, BGR.

Update background paper for the 9th Annual CASM Conference (ACC)

In 2008 CASM produced the background paper “Certification and Artisanal and Small-Scale Mining: an Emerging Opportunity for Sustainable Development”. The paper provided information on the emergence of minerals certification as a tool for development in artisanal and small scale mining communities. It explains what mineral certification and fair trade are and how they work.

CASM has been supporting the concept of fair trade and minerals certification actively since 2005. Since that time the concept has made significant progress year after year. Consumers are clearly demanding responsibly mined products – be it in jewelry or industrial minerals – which presents a market driven development opportunity for artisanal and small scale miners.

In 2009 the CASM ACC will highlight some of the progress and key milestones in development of certification and fair trade for ASM. Through fair trade miners have the opportunity to improve incomes and reduce negative environmental and social impacts at the same time.

The Alliance for Responsible Mining (ARM) has partnered with the Fairtrade Labelling Organizations International (FLO)<sup>1</sup> on a joint fair trade standard for artisanal and small-scale mining for gold and associated metals. The standard is based mainly on the ARM Standard Zero which has been a leader in this area and featured in previous CASM ACCs. The values are inspired by the successful Oro Verde (Green Gold) initiative in Columbia and FLO’s standards for small producer’s organizations. ARM will provide an update on the process at the ACC in Maputo and conduct in depth discussions on the standard with stakeholders in Chimoio.

The German Government’s Bundesanstalt für Geowissenschaften und Rohstoffe (BGR) has developed a certification scheme for stanniferous minerals (e.g. coltan) to certify local producers and international buyers under recognized standards for mining and trade. The G8 pilot project on Certified Trading Chains in

Mineral Production (CTC) is jointly carried out by BGR and the Rwandan Geology and Mines Authority (OGMR). It determines the steps necessary in order to promote a transparent, fair and sustainable raw materials industry by developing a certification mechanism in Rwanda. It is a national contribution with a commitment to the regional certification mechanism of ICGLR. The 2008 CASM ACC provided input into the design of the scheme. BGR will present on its progress to date at the ACC in Maputo.

The Diamond Development Initiative (DDI) launched the consultation process for “Development Diamonds Standards” in August 2009. DDI describe Development Diamonds as “diamonds that are produced responsibly; safely; with respect of human and communities’ rights; in conflict-free zones; and with beneficiation to communities and payment of fair prices to miners”. Minimum performance standards will be established for operations in developing countries and are being designed to primarily be accessible to artisanal and small scale miners.<sup>2</sup> The survey can be completed at <http://www.survey.ddiglobal.org/index.php?sid=22489&lang=en> and closes on September 10, 2009.

The current economic conditions have affected the gemstone sector through depressed prices. However as evidence of the consumer demand for responsible products and the business case for certification, Wal-Mart has partnered with Conservation International, mining companies and other stakeholders to develop the Love Earth gold and silver jewelry range. While not focused on artisanal and small scale mining at this time, the launch of Love Earth shows the power of linking the consumer with the origin of the product. The Love Earth website has a tool where you can trace the origin of the jewelry you purchase. Love Earth will present at the ACC in Maputo.

The International Colored Gemstone Association (IGA) will also present at the ACC in Maputo on IGA initiatives on certification.

The ACC will be an opportunity to update miners, governments, jewelers, suppliers and traders on the latest developments in fair trade and certification for ASM. It is our hope that

you will be inspired to be part of this exciting opportunity.

### **Endnotes**

1. ARM-FLO Gold Standard Consultation Document August 2009
2. DDI Development Diamond Standards consultation launch email August 20, 2009



---

# ORGANISATION

---

## **CASM Secretariat:**

www.artisanalmining.org

Gotthard Walser  
gwalser@worldbank.org  
+1 202.473.4234

Christopher Sheldon  
csheldon@worldbank.org  
+1 202.473.8953

Veronika Kohler  
vkohler@worldbank.org  
+1 202.458.9597

Nellie Mutemeri  
**CASM Africa Secretariat**  
mutemerinellie@gmail.com  
casm.africa@gmail.com  
+27.71.606.1996

## **National Organizing Committee**

Mr. Abdul Razak – *President*

Mr. Horácio Belenguese – *Supervisor*

Ms. Fatima Mamade – *Coordinator*  
fmomade@tvcabo.co.mz  
+258.82.303.6827

Mr. Geraldo Valoi – *Provincial Coordinator*  
+258.82.616.7394

Mr. Salvador Mondlane – *Scientific issues*  
salmond@zebra.uem.mz  
+258.82.494.7780

Mr. Noa Inacio – *Secretariat*  
noa.inacio@gmail.com  
+258.82.714.8520

Ms. Herminia Xavier - *Finances*  
+258.82.826.8980

Abdul Remane  
machonabdurramane@hotmail.com  
+258.82.381.0043

## Board Members

**Mr. Jon Hobbs**  
**CASM Chairman**  
DFID  
United Kingdom

**Mr. Paulo De Sa**  
**CASM Co-Chair**  
World Bank  
USA

**Mr. Ben Aryee**  
Minerals Commission  
Ghana

**Prof. Lei Shen**  
Chinese Academy of Sciences  
China

**Mr. Kevin D'Souza**  
Institute of Materials,  
Minerals & Mining  
United Kingdom

**Mr. Linus Adie**  
Ministry of Solid Minerals  
Nigeria

**Mr. Antonio Pedro**  
UNECA  
Ethiopia

**Dr. Satoshi Murao**  
AIST  
Japan

**Mr. Jean-Claude Guillaneau**  
BRGM  
France

**Mr. Assheton Carter**  
PACT  
USA

**Mr. Martin Hahn**  
ILO  
Switzerland

**Dr. Toni Aubynn**  
Gold Fields (Ghana)  
Ghana

**Dr. Chuluunbaatar**  
Enkhzaya  
SAMM  
Mongolia

**Mr. Eduardo Chaparro**  
CEPAL  
Chile

**Mr. John Tychsen**  
GEUS  
Denmark

**Dr. Nellie Mutemeri**  
South Africa

**Mrs. Anne-Marie Fleury**  
ICMM  
England

---

### Chairs of Regional CASMs

*CASM Africa*

Mr. Linus Adie

*CASM Asia/Pacific*

Dr. Satoshi Murao

*CASM China*

Prof. Lei Shen

*CASM Latin America*

under development

### CASM Secretariat

Gotthard Walser

Christopher Sheldon

Veronika Kohler

