

Investigating Approaches to Working with Artisanal and Small-scale Miners: A Compendium of Strategies and Reports from the Field

Researchers: Nina Collins; Lynda Lawson
School/Centre: Centre for Social Responsibility in Mining
University/Institutions: Sustainable Minerals Institute, University of Queensland

Key themes: Governance and Regulation
Community and Environmental Sustainability

Key countries: Madagascar; Ghana

Completion: July 2014

Research aims:

This research sought to address the following:

- Investigate and document approaches to working with Artisanal and Small Scale Mining (ASM) from a governance and training perspective
- Inform the ongoing development of Return-to-Work Plans with IM4DC programme alumni

For further information on this action research:

Contact person: Nina Collins

nina.collins@uq.edu.au

Powerpoint presentation:

Artisanal and small-scale mining (ASM): Training and governance initiatives & group activity

IM4DC Action Research Report



Summary of Action Research Activity

Investigating approaches to working with artisanal and small-scale miners: a compendium of strategies and reports from the field


This report documents approaches to working with artisanal and small-scale mining (ASM), with a focus on sub-Saharan Africa. ASM is an important economic activity and livelihood strategy in many developing countries. However, it is associated with many negative social, environmental and health impacts and presents specific challenges in terms of sustainable development. Personnel working for government, civil society and universities in developing countries who have undertaken capacity-building programmes in Australia through the International Mining for Development Centre (IM4DC) have frequently raised the issue of ASM and requested further training in this area. This report assists in improving IM4DC's capability to provide capacity building focused on ASM by building its understanding of the varied issues associated with ASM and the key strategies used by various actors to deal with them.

The report draws on literature and interviews with 18 individuals working directly with ASM to provide a compendium of strategies for working with ASM. In addition, it documents and evaluates the progress of a selection of ASM-focussed 'Work Plans on Return' (WPRs) developed by alumni from IM4DC capacity-building programmes, providing insight into the types of initiatives currently underway on the ground and the learning implications for the development of WPRs in the future. A detailed report on WPRs from Madagascar and Ghana is provided along with a contextual overview of ASM in these two countries.

Key strategies for managing ASM fell broadly into the following areas:

- Knowledge-based strategies
- Regularisation and formalisation of ASM
- Cooperatives and associations
- Training/capacity building programmes
- Strategies focused on mercury
- Financial assistance
- Fair trade, standards and certification initiatives
- Beneficiation of resources
- Strategies to manage the intersection of ASM with large-scale mining
- Land rights/securing tenure for miners
- Reclamation of lands mined by small-scale miners
- Gender-focused initiatives
- Alternative livelihoods approaches

Recommendations are provided for future strategic research and training approaches, as well as recommendations for facilitating the development of WPRs in the future.



Investigating approaches to working with artisanal and small-scale miners (ASM): A compendium of strategies and reports from the field

Authors

Nina Collins
Lynda Lawson

Research team

Nina Collins
Lynda Lawson

Reviewer

Nicole Smith

Research supervisor

Dr Kathryn Sturman

Acknowledgements

The researchers would like to thank the International Mining for Development Centre for its support of the project, particularly Robin Evans (IM4DC Deputy Director). We would also like to acknowledge Carmel Bofinger, Associate Professor at the Minerals Industry Safety and Health Centre (MISHC), for allowing us to draw on data and findings from her work. Thank you to Phil Clark for facilitating the use of M4DLink and to all the alumni of Australian aid-funded short courses in Australia whose Work Plans on Return and expertise we drew upon for our research.

Centre for Social Responsibility in Mining



The Centre for Social Responsibility in Mining (CSR) is a leading research centre, committed to improving the social performance of the resources industry globally.

We are part of the Sustainable Minerals Institute (SMI) at the University of Queensland, one of Australia's premier universities. SMI has a long track record of working to understand and apply the principles of sustainable development within the global resources industry.

At CSR, our focus is on the social, economic and political challenges that occur when change is brought about by resource extraction and development. We work with companies, communities and governments in mining regions all over the world to improve social performance and deliver better outcomes for companies and communities. Since 2001, we have contributed significantly to industry change through research, teaching and consulting. This centre is led by Professor Dr Saleem Ali.

Contents

Contents	2
Introduction	5
Section One: Compendium of Strategies (Literature Review)	7
Artisanal and small-scale mining (ASM): Definitions and characteristics	7
Knowledge-based strategies	12
National and local data on ASM	12
Knowledge sharing	13
Local-level community consultation, dialogue and participation	15
Regularisation and formalisation of ASM	15
Putting legislation in place	16
Enforcement	17
Incentives and strategies to overcome obstacles to formalisation	17
Cooperatives and associations	20
Training/capacity building programmes	22
Technical support and assistance	23
Assistance centres	24
Strategies focused on mercury	24
Minamata Convention on Mercury	27
Centralised processing centres	28
Mercury retorts	30
Clean/No-mercury technologies	32
Financial assistance	33
Fair Trade, Standards & Certification initiatives	34
Beneficiation of resources	35
Intersection of ASM with large-scale mining	37
Geological information and demarcating areas for ASM	37
Relocation to demarcated areas	40
Technology transfer	40
Land rights/Securing Tenure for miners	41
Reclamation of lands mined by small-scale miners	41
Gender-focused strategies	42
Research into women miners	44
Gender sensitive access to microcredit	44
Alternative livelihoods approaches/Livelihood diversification	45
Section Two: Work Plans on Return	47
Methodology and overview	47
Occupational Health and Safety	50
Sensitisation and training initiatives for miners	51

Checklist/manual for inspectorates	56
Guidelines for miners	56
Governance/Regulation	57
Amending legislation	58
Encouraging formalisation through training	58
Formation of cooperatives	59
Policy research	61
Environmental impacts	61
Guidelines	62
Capacity building	64
Monitoring	64
Research	65
Alternative livelihoods	66
Gender	67
Intersection with large-scale mining	68
Technology	68
Financial aspects	69
Advocacy	69
Section Three: Madagascar	70
Political context	70
Madagascars' mineral wealth	71
Gold	71
Gemstones	72
Challenges for the Madagascan Government in relation to ASM	72
Rushes	72
Failure to capture revenue from ASM	73
Lack of reliable data	73
Clandestine networks operating on the gem fields	73
Large-scale mining	73
Madagascar Work Plans on Return (WPRs)	74
General progress and findings	74
Detailed progress report	75
Section Four: Ghana	86
Types of small-scale mining	86
Political and legislative context (legislation for ASM in Ghana)	87
Drivers of ASM in Ghana	88
Challenges for the Ghanaian Government in relation to ASM	90
Illegality	91
ASM and large-scale mining	92
Traditional authorities and customary land tenure	94
Health and environmental impacts	94

Ghana Work Plans on Return (WPRs)	96
General progress and findings	96
Detailed progress report	96
Section Five: Conclusions and Recommendations	101
Types of initiatives	101
Training	102
Monitoring	102
Guidelines	103
Government processes	103
Mercury	103
Cooperatives in ASM	104
Gender and ASM	104
Work plan on return (WPR) process	104
Literature reviews, baseline studies and participatory approaches	106
Stakeholders	107
Template	108
SMART objectives and project planning tools	108
Monitoring and evaluation	109
Barriers to WPR implementation	110
References	111



Introduction


This report documents approaches to working with artisanal and small-scale mining (ASM). ASM is an important livelihood strategy in developing nations, and in Africa in particular (Economic Commission for Africa 2011). However, it is associated with many negative social, environmental and health impacts and presents particular sustainable development challenges. Numerous universities, NGOs, associations, companies and governments are working to find approaches to the challenges of ASM, which include lack of formalization and regulation, poor environmental practices, health and safety hazards, child and forced labour, security and human rights risks, conflicts with large-scale mining, issues around relocation, and inequitable distribution of benefits (ICMM 2009).

The International Mining for Development Centre (IM4DC) and Centre for Social Responsibility in Mining (CSRMI) have been involved in a number of Australian aid-funded training programmes for personnel working for Government Ministries, local Government, NGOs and associations, and universities in developing countries. In each group of professionals involved in these programmes, individuals have raised the issue of ASM and requested further training in this area. This report will assist in addressing this request by improving IM4DC's understanding of the key initiatives currently used by government and other organisations in dealing with the varied issues associated with ASM. It draws on literature and interviews with individuals working directly with ASM.

In addition, a significant component articulated in almost all IM4DC training programmes is the development of 'Work Plans on Return' (WPRs) by visiting professionals. The objective of the WPRs is for participants to reflect on their learning and develop a tangible plan of action addressing a key issue related to mining in their home countries. The WPRs are typically formulated with a participant's manager before departure and then developed during the course. The participants present the WPRs to their fellow participants, and subsequently work towards implementing these through their organisation of employment upon return to their home countries. A common theme in the WPRs has been ASM. This report documents and evaluates the progress of a selection of WPRs focused on ASM, providing insight into the types of strategies currently underway on the ground in relation to ASM and the learning implications for the development of WPRs in the future.

This report is divided into five sections:

Section One: Compendium of Strategies (Literature Review) provides a review of literature documenting current approaches to supporting and regulating ASM used by international donors, national and sub-national governments, civil society, universities, ASM associations and other stakeholders. It draws on academic literature, reports written




by government and non-government organisations, local and international artisanal and small-scale mining networks and large-scale mining stakeholders, as well as interviews with 18 individuals working with ASM from both developing and developed countries.

Section Two: Work Plans on Return provides a description and overview of the 34 WPRs reviewed for this study. It provides an overview of the current initiatives being used to address the issues associated with ASM, highlighting areas of focus in the governance arena. It also provides a brief update on progress for nine of the 20 WPRs for which progress data was collected (progress data for the existing 11 WPRs that have progress data is provided in the following sections focused on Madagascar and Ghana)

Section Three: Madagascar provides a contextual overview of ASM and the key governance issues in Madagascar by drawing from the literature and through a more detailed examination of the eight WPRs collected from Madagascar. It also documents their progress successes, challenges, and learning implications for future WPRs.

Section Four: Ghana provides a contextual overview of ASM and the key governance issues in Ghana by drawing from the literature and through a more detailed examination of the three WPRs Ghana. It also documents their progress, successes, challenges, and learning implications for future WPRs.

Section Five: Conclusions and Recommendations provides conclusions and recommendations for future strategic research and training approaches to key issues regarding ASM, as well as recommendations for facilitating the development of WPRs in the future.



Section One: Compendium of Strategies (Literature Review)


This section provides a broad introduction to ASM and an overview of the key initiatives for managing the many and varied issues facing the professionals working with artisanal and small-scale miners. It is based on academic literature, reports written by government and non-government organisations, local and international artisanal and small-scale mining networks and large-scale mining stakeholders. It is not an exhaustive review of all the issues associated with ASM around the world, but rather focuses on key areas for future training and development for IM4DC. Along with the literature, this section draws on:

- A review of 34 Work Plans on Return focused on ASM; and
- Interviews with:
 - 13 individuals working with ASM in governments and/or universities in developing countries (Kenya, Cameroon, Ghana, Nigeria, Burundi, Ethiopia, Philippines, Liberia, Malawi)
 - five individuals (or ‘experts’) working at universities and international organisations in developed countries who are involved in initiatives related to improving the governance of ASM in developing countries.

Artisanal and small-scale mining (ASM): Definitions and characteristics

Artisanal and small-scale mining (ASM) occurs in approximately 80 countries across the globe (World Bank 2013). ASM has expanded rapidly in many developing nations driven by increasing population pressure and limited alternative income sources in rural areas (Lahiri-Dutt 2004). Although it has taken some time, international development institutions now widely agree that ASM is largely a poverty-driven activity (Aryee et al. 2003; Hilson & Banchirigah 2009; Hilson & Garforth 2013). In fact, there is a correlation between the Human Development Index (HDI) of a country and the total proportion of the workforce involved in ASM (Hoadley and Limpitlaw 2004, cited in Yakovleva 2007). Estimates of the number of people involved in ASM worldwide vary dramatically, ranging from 13 million (ILO 2003) to 50 million (Zolnikov 2012).

There is no universal definition of ASM (Andrew 2003; Hinton 2006), and some commentators argue that the only characteristic that can be universally applied to ASM is the “impossibility of defining it according to any universal parameters” (Chaparro Ávila 2003, p. 15). Different countries define ASM in their legislation according to different criteria, such as volume of production, volume of output, the amount of capital invested,




the size of the workforce, the size of a claim, the depth of the mine, and/or the level of sophistication of the mining equipment used (Andrew 2003; Chaparro Ávila 2003). The variation between countries in terms of both the choice of variables used and the value they are given means that it is difficult to achieve consensus on what constitutes ASM (Andrew 2003; Hinton 2006).

Efforts to create a clear distinction between artisanal and small-scale miners, just like efforts to clearly define ASM in the international arena, have failed (Veiga et al. 2006). ASM actually represents a spectrum of mining activities ranging from individuals panning for gold or precious stones along riverbanks, to relatively large and organised operations (Hinton 2006; Veiga et al. 2006). While some countries make a distinction between 'artisanal mining' and 'small-scale mining' in their legislation, others (e.g. Ghana) do not. However, most countries now have mining legislation and regulations differentiating between large-scale (or industrial mining) and ASM.

ASM is generally distinguished from industrial mining by a low level of production (although in some regions, e.g. Brazil, this can be high); relatively low degree of mechanization/technological development (e.g. miners often use picks, chisels, sluices and pans); high degree of labour intensity; little capital investment; lack of long-term planning; informality; and poor occupational health, safety and environment conditions (Chaparro Ávila 2003; Hinton et al. 2003b; Lahiri-Dutt 2004; Hinton 2006; Adler Miserendino et al. 2013). Other characteristics of ASM include (Chaparro Ávila 2003; Hinton et al. 2003b; Hinton 2006; Adler Miserendino et al. 2013):

- Widespread geographical distribution
- Decentralised activities
- An employment option in remote rural regions, reducing rural-urban migration
- Supplies local markets
- Stimulates local economies
- Generates local production chains
- Encourages geopolitical development
- Often discovers new deposits (but can involve extraction of primary or secondary ores)
- Encourages larger projects
- Involves a number of stakeholders
- Leads to social conflict

There are four basic types of minerals extracted by ASM: 1) precious and semi-precious minerals, particularly gold and gemstones; 2) metallic minerals such as copper, zinc and tin; 3) industrial minerals such as limestone and marble; and 4) construction materials, including kaolins, feldspars, clays, sand and gravel (Andrew 2003; Chaparro Ávila 2003).



The ASM sector is estimated to produce 15 to 20% of all global minerals and metals including up to 80% of all sapphires and up to 20-30% of gold (Estelle Levin Ltd 2012; Sippl & Selin 2012).

The International Council on Mining and Metals (ICMM 2009b) has classified ASM into five categories (which are by no means mutually exclusive, and a combination of these categories will generally be found in any given ASM location):

1. Traditional – ASM that has occurred for generations in a given area and may form part of traditional livelihoods.
2. Seasonal: ASM that complements other seasonal livelihoods, such as agriculture or the rearing of livestock.
3. Permanent Co-habitation: ASM that takes place in areas connected with large- or medium-scale mining, such as miners working in abandoned areas, in tailings dams, or downstream of the larger operations.
4. Shock: When unexpected events, such as drought, economic collapse, commodity price fluctuations, conflict, retrenchment from mining parastatals, and unexpected commercial mine closure drive individuals into ASM.
5. Influx: The opportunistic in-migration or an influx of ASM miners to an area where minerals have been discovered.

ASM has a broad range of negative impacts, including (but not limited to) those shown in Figure 1 below.



Figure 1: Negative impacts of ASM

While ASM has a broad range of negative impacts, it also has positive attributes including:

- Provides employment where economic alternatives are critically limited (Hinton 2006).
- Provides an alternative to agriculture in the face of structural adjustment programs (Hilson & Garforth 2013).
- Reinvigorates deteriorating smallholder farming activities (Hilson & Garforth 2013).
- Catalyses the growth of infrastructure.
- Reduces rural-urban migration (Hinton 2006).
- Creates downstream employment.
 - It is estimated that six downstream jobs are created per individual directly employed in ASM (Hilson et al. 2014).

- Accommodates a range of occupations.
 - e.g. service people (taxi drivers, cooks, clothing merchants), semi-skilled labourers (machine operators, repairmen), and skilled and educated groups (bookkeepers, accountants, technicians) (Hilson et al. 2014).
- Contributes to foreign exchange earnings.
- Enables the exploitation of mineral deposits that are not attractive to formal mining companies (Hinton 2006).
- Contributes to economic growth.

Many papers and reports describe the key problems affecting the ASM sector and the structural challenges preventing sustainable development (see, for example Buxton 2013, pp. 5-10 and Hentschel et al. 2002, p.6 for good overviews). According to Hentschel et al. (2002), approaches used by the international development community to deal with ASM have changed as understandings of ASM have increased. The authors summarise these approaches as follows:

Table 1: Approaches for dealing with ASM

Period	Approaches for dealing with ASM
1970's	Definitional issues
1980's	Technical issues
Early 1990's	Towards integration of technical, environmental, legal, social and economic issues
1990's	Special attention on legalisation of ASM sectors
Mid to late 1990's	Relation between large mining companies and ASM Gender and child labour issues
2000's	Community related issues and sustainable livelihoods
Reproduced from (Hentschel et al. 2002, p. 9)	

Hilson and McQuilken (2014) assert that despite four decades of attention on ASM, it is still on the “periphery of poverty alleviation and local economic development policy”, and “[i]n the case of sub-Saharan Africa, failure to recognize the sector’s growing economic importance has impeded its development”.

The following sections describe the key strategies described in the literature and interviews with professionals working with ASM that have been used at the international, national, regional and local levels to mitigate the negative impacts and enhance the positive impacts associated with ASM.



Knowledge-based strategies

National and local data on ASM

Lack of reliable data about the scale and scope of ASM production and target ASM populations is a key challenge for government authorities and other key stakeholders looking to develop effective policies and programmes (Banchirigah 2008; Cook & Healy 2012). According to Hilson & Maponga (2004, p. 22), there is an “acute shortage of baseline census and geological information” on ASM:

“few governments possess comprehensive data of the whereabouts of resident artisanal operators as well as how many individuals are, in fact, operating as miners. This raises questions such as: Who is mining and for what purpose? and What do different groups of miners require in order to improve their operating techniques and living conditions?”

This lack of knowledge has led to the design and implementation of many inappropriate technologies and support services for the ASM sector (Banchirigah 2008). For this reason, a number of authors have written about failed interventions in ASM (e.g. Hilson et al. 2007a; Childs 2008) but fewer have documented what has worked.


Many of the initiatives used to address ASM have treated it as a subset of large-scale, formal mining, which has resulted in policies that do not take into account ASM’s specific socio-economic and environmental problems (Childs 2008, p. 204, citing ILO 1999). Given the very localised and context specific characteristics of ASM, more baseline information about the sector and the people involved, as well as insight into organisational structures and labour hierarchies at the national and local level is necessary (Hilson 2009). This would assist the development of locally relevant initiatives, as Hilson (2007, p. 239) emphasises:

“Without information about communities, baseline geological data, and knowledge of indigenous practices, how can appropriate technologies, policies and assistance schemes be devised and implemented?”

Better knowledge of ASM on the ground would also allow citizens and civil society to hold policymakers accountable.

However, there are a number of obstacles to data collection in mining communities (Heemskerk 2005, pp. 84-5):

- Production variability complicates the estimation of income averages.
- Income variation between individual miners and ASM operations
- Few ASM operators keep (adequate) records of their earnings and investments.

- 
- Miners often work informally or illegally and fear government interference and distrust outsiders. As such, they may distort information or not reveal that they employ clandestine labourers, sell their production outside legal channels, and violate national labour, environmental, and other regulations.
 - Income from ASM is difficult to quantify, as it cannot be isolated from the household's other income generating activities.
 - The heterogeneity of the ASM sector makes it difficult to draw generalised conclusions or recommendations about a particular ASM population
 - The mobile and transient nature of especially migrant ASM populations complicates study replication.
 - Violent crime, drugs, the use of firearms, and related illegal activities make it dangerous for researchers to visit and collect data on certain mining sites, especially where gold and diamonds are mined.
 - Socioeconomic relations in ASM operations are shaped by cultural beliefs and practices that may or may not be adequately understood by a short-term foreign consultant.

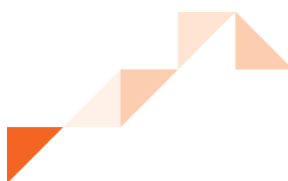
Buxton (2013) suggests that a tool for collecting baseline data on ASM communities should be designed which uses research methodologies based on practice-informed and community- or citizen-based knowledge:

“There is a need to better understand the structural challenges facing local miners and their communities in each area to ensure successful and appropriate policy design and implementation. Identifying a tool for collecting baseline information from an ASM community – what needs to be known for policy to reflect understanding of the diversity and structural challenges of the community – and the metrics to determine ‘success’ in ASM and sustainable development is a knowledge gap that needs filling by drawing on what is already known and testing it to gather citizen knowledge from ASM communities themselves” (Buxton 2013, p. 18).

Some such tools already exist, such as the rapid assessment toolkit *Gender Dimensions of Artisanal and Small-Scale Mining* (Eftimie et al. 2012) produced by the Oil, Gas, and Mining Policy Unit of the World Bank, and the *Methodological Toolkit for Baseline Assessments and Response Strategies to Artisanal and Small-Scale Mining in Protected Areas and Critical Ecosystems* (Hinton & Hollestelle 2012) produced by the World Wide Fund for Nature (WWF) and Estelle Levin Limited.

Knowledge sharing


In addition to the collection of reliable data, sharing knowledge on ASM's diversity of causes, motivations and outcomes would assist different stakeholders (e.g. international donors, national governments, local governments, universities, civil society, large-scale



mining sector etc.) to develop locally relevant initiatives and avoid replicating ineffective policies and programmes and improve coordination (Buxton 2013). According to Buxton (2013), there is poor coordination of what is and is not known about the ASM sector and a large amount of practice-informed knowledge is not documented or publicly shared. Examples of knowledge-sharing programmes include:

- National, bi-national and regional meetings and events focused on improving different aspects of the ASM sector.
- Cross-disciplinary work to create bridges and improve coordination between different stakeholders working with ASM. Examples include fostering links between academic research and policy making at the national level through ongoing research programmes focused on ASM policy analysis to inform national programmes, or providing opportunities for civil society to review draft legislation and policy or provide feedback into reviews on the effectiveness of policy implementation.
- Multi-stakeholder dialogue processes to increase engagement between policymakers and ASM communities and empower local communities as decision-makers in policymaking processes (Spiegel & Veiga 2010; Buxton 2013).
- Processes such as the ‘learning groups’ model employed by the International Institute for Environment and Development (IIED), which selects individuals in a country to meet and exchange ideas and information and then put their shared knowledge into action in their own working environments or networks (refer to Buxton 2013).
- A virtual network to provide a database of projects, research, and organisations working with ASM, such as that previously provided by the World Bank’s now defunct Communities and Small-Scale Mining Initiative (CASM) (Buxton 2013).
- Networks to connect artisanal and small-scale miners at the country level.

After the demise of CASM (refer to Hilson & McQuilken 2014, pp. 12-3 for further information), the International Institute for the Environment and Development (IIED) attempted to regroup international interest with a program emphasising knowledge transfer (Buxton 2013). Buxton found that some of the most valuable aspects of CASM had been its knowledge-sharing events. Thus, in 2013, IIED began the process of establishing a 5-year knowledge programme, *IIED ASM Knowledge Programme, 2013-2018*, aimed at addressing three interlinked needs: 1) lack of knowledge about the ASM sector and effective solutions; 2) lack of connections, trust and collaboration between sector stakeholders; and 3) poor presentation of miners’ and on-the-ground voices in higher-level decision making (IIED 2013). The project is ongoing and consists of the following core components: the creation of six country learning groups and ASM outlook reports; the facilitation of multi-stakeholder dialogues on contentious issues; the development of an online ASM resource centre and virtual network; and global engagement on policy and communications (IIED 2013). So far, they have three partners



to implement the project: Pact, Alliance for Responsible Mining (ARM) and Development Alternatives (DA).

Local-level community consultation, dialogue and participation

A number of authors advocate for increased engagement with mining communities and the use of participatory models of data collection, project planning and implementation and monitoring to ensure that programmes, including technology transfer and regulatory systems are appropriate for the local context (Lahiri-Dutt 2004; Heemskerk 2005; Hilson et al. 2007a; Tschakert & Singha 2007; Dondeyne et al. 2009; Spiegel & Veiga 2010). For example, Hilson (2007, p. 236) asserts that:

“subsistence miners, particularly those operating in Africa, continue to play an insignificant role in key decision-making processes. Despite being the subject of millions of dollars in donor aid and assistance, few have had meaningful inputs into the very licensing processes, [alternative livelihoods] projects, mercury abatement programmes and equipment selection activities, allegedly being implemented to improve their quality-of-life”.

Many of the participants researched for this project also discussed the need for more consultation, participation and involvement of stakeholders (including those directly involved in ASM) prior to the development of initiatives. One interviewee suggested that while many reports have been written about the issues surrounding ASM, little has been done in the way of implementation of these findings. Some commentators have referred to this situation as ‘research fatigue’ and point to the need for more action on the ground (see Hilson 2007, who does not agree that the problem is an excess of research but rather an excess of ‘inappropriate research’). The importance of communicating the findings of research to ASM communities themselves was also emphasised.

Regularisation and formalisation of ASM

In most countries, the majority of ASM activities are undertaken outside of the legal framework, with miners operating either illegally or informally (ILO 1999; Hinton 2006). In some countries, as much as 80% of ASM activities take place outside of a legal framework (ILO 1999; Hinton 2006). There is an emerging consensus that formalisation is a key strategy for regulating the ASM sector, increasing the sustainability of activities, creating benefits for communities and minimising negative impacts (Lowe 2005; Siegel & Veiga 2009; Maconachie & Hilson 2011). According to Lowe (2005, p. 13), “formalisation is an essential prerequisite for facilitating support of any kind for small-scale mining”.




Putting legislation in place

Hentschel et al. (2002, as cited by Maconachie and Hilson 2011, p. 294) argue that “the first step in tackling the sector’s problems is to create adequate legal regimes that address the specific characteristics of the industry.” In the 1990s, many countries in sub-Saharan Africa attempted to formalize their ASM sectors by introducing legislation and regulatory frameworks that required artisanal and small-scale miners to obtain licenses and permits to operate (Hilson et al. 2014). Regularisation of ASM in sub-Saharan Africa began in Ghana with the implementation of its Small-scale Gold Mining Law 1989 that enabled the purchase of a license for small-scale mining activities, which was the first of its kind in sub-Saharan Africa. By the mid-1990s, 36 African countries had legalized ASM (Hilson et al. 2014). However, according to McQuilken (2013), the majority of sub-Saharan states still lack specific ASM legislation or have “outdated and porous” legislation that is too broad in scope and does not specifically address the nuances of ASM.

There are many challenges to formalization/regulation, not in the least the fact that different stakeholders have different priorities (Maconachie & Hilson 2011). Difficulties in agreeing on how ASM should be classified can also impede the development of legislation (Hinton 2006). For example, classifications that do not take into account the complexities on the ground can also work as a disincentive for miners to formalise their activities. A case in point, in Ecuador, miners can be classified into two groups: 1) ‘Artisanal miners’: miners that extract ore from mines, and use processing centres owned by others to recover around 20-40% of gold, leaving tailings as payment or part payment for the use of equipment; and 2) ‘small-scale miners’: owners of the processing plants, who use more advanced techniques (e.g. cyanidation) to recover the remainder of the gold in tailings (Adler Miserendino et al. 2013). The current mining law differentiates between the two based on tonnage of ore processed and income generated, which does not account for the extent to which the two groups of miners are mixed and mutually dependent on one another. In addition, artisanal miners, unlike small-scale miners, are not required to undertake an Environmental Impact Assessment (EIA) and are not taxed. This is said to fuel resentment and non-compliance on behalf of small-scale miners and serves as a disincentive for miners to become more organized and to grow their operations into more productive, sustainable enterprises, effectively encouraging the unplanned nature of ASM.

Fold et al. (2013) argue that research and policies should identify new entry points for formalization beyond isolated entry points in the ASM chain from production to consumption. For this to happen, better understanding is needed about how the formal and informal ASM sectors are intertwined, and

“how ‘labour markets’ are interlocked with product markets, i.e. how miners are paid by the employers (pit holders and/or license owners), by which means they are paid (ore, cash, or others) and how they make a living between the ‘pay-rounds’ (for



instance through provision of subsistence or credit from the employer)” (Fold et al. 2013, p. 10).

Because formalisation relies on enforcement on the ground, it is important to involve local authorities and communities in policy-making processes, to ensure that locally-specific issues are considered (Lowe 2005 as cited by Maconachie & Hilson 2011 and Spiegel 2012). Hentschel et al. (2002) identify the decentralisation of control of the ASM sector as a way to ensure that legislation and regulation reflects the realities on the ground.

Enforcement


Formalisation refers not only to the presence of legislation, but also to “the activation and enforcement of it by authorities and the extent of their success” (Hilson et al. 2007a, pp. 276-7). The literature and interviews identified the lack of enforcement of legislation as a key issue. Ambiguous legislation or legal frameworks that are inappropriate to ASM operators, lack of political will, lack of financial and/or human resources (e.g. inspectors), corruption and conflicting priorities of stakeholders mean that legislation might not be enforced (AngloGold Ashanti 2006; Maconachie & Hilson 2011).

While a number of UN and World Bank projects are dedicated to assisting countries to formalize their ASM sector, many of these projects prioritise national-level governance structures while by-passing local governance structures (Spiegel & Veiga 2010; Spiegel 2012a). For example, many conferences on ASM focus on the role of national governments in relation to ASM and do not include local government actors (Spiegel 2012a). In countries where legislation and policies for ASM are already in place, increased monitoring and auditing of policy implementation that includes local stakeholders is necessary.

Incentives and strategies to overcome obstacles to formalisation

There are a number of barriers for miners in terms of formalisation. Refer to Table 2 for examples of obstacles to formalisation and incentives or strategies to counteract these obstacles.

Prior studies (e.g. USAID 2010; Spiegel 2012a; Buxton 2013) have shown that formalisation initiatives need to include incentives to encourage miners to participate in the schemes. For example, from 2005 to 2012, under a project called Sustainable Management of Mineral Resources Project, the Ministry of Mines and Steel Development of Nigeria and the World Bank operated a gender sensitive micro grant scheme open to mining cooperatives to formalise their activities. Women miners were quick to take up the challenge and when they formalised their activities they became eligible for small grants. For example, the Sokoto Women Miners Association purchased trucks to transport



gypsum; the Irrigwe Women's Cooperative purchased milling equipment; and Otuifunaya Women's Multi-Purpose Cooperative Society purchased a jaw crusher and generator (World Bank 2012a).

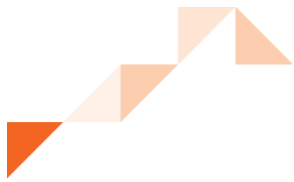
Such incentives encourage a practical "bottom up" approach to ASM where formalisation flows up from the encouragement and establishment of cooperatives and associations and capacity building through technology acquisition and transfer (Hilson & Ackah-Baidoo 2011). This is in contrast with more heavy handed "top down" approaches which often seem to favour large-scale companies and where procedures for obtaining a small-scale licences are bureaucratic and overly complex (Hilson & Ackah-Baidoo 2011).

Table 2: Obstacles to formalisation and incentives/strategies to encourage formalisation

Obstacles to formalisation	Incentives/strategies to encourage formalisation
Miners feel there is little difference between being legal and illegal	<p>Linking technical support and capacity building activities to formalisation</p> <p>Linking access to credit to formalisation</p> <p>Government purchasing commodities at a higher price than informal markets</p>
Miners' lack of knowledge of legal requirements	<p>Capacity building/awareness programmes</p> <p>Communicating more regularly and effectively with miners</p>
Traditional and cultural practices – e.g. operating individually without seeking permits; chieftaincy systems	<p>Baseline information to understand target community</p> <p>Increasing local participation, including traditional authorities, in initiatives linked to formalisation,</p> <p>Working closely with local organisations and communities</p>
Licensing fees are too high for miners	<p>Reducing costs in licensing, royalties, taxes and fees – e.g. see the comparative study undertaken by USAID (2010), which assessed how legalization of artisanal diamond miners can be promoted through reduced costs of licensing, royalties, taxes, and fees</p>
Miners fear having to pay taxes, royalties and fees if legalised	<p>Tax incentives</p> <p>Incentives which provide direct access to</p>



	<p>markets which pay higher prices for commodities than the informal market</p> <p>Capacity building and training programs linked to formalisation</p>
Complex, bureaucratic process to formalise	<p>Simplifying licensing procedures</p> <p>Providing decentralised support to miners in the formalisation process</p>
Miners have to travel to large centres to apply for license	Decentralising licensing procedures to regions where mining is taking place
Miners have to re-apply for licenses every two to three years, making it difficult and costly for miners to maintain legal status	<p>Increasing license expiration period</p> <p>Reducing bureaucratic procedures for reapplication of license</p>
Free access to most convenient buying agents (inc. non-licensed) as informal enterprises	<p>Government purchasing commodities at a higher price than informal markets</p> <p>Access to markets which pay higher prices for commodities than the informal market, e.g. Oro Verde and Fairtrade initiatives.</p>
Mobility of small-scale and artisanal miners – informality helps to maintain flexibility in shifting from one site to another	<p>Geospatial data</p> <p>Geological mapping</p>
Limited access to mining concessions for small-scale and artisanal miners	Demarcation of areas for ASM
Rare visits and inspections of ASM mines	<p>Decentralisation of offices to mining areas</p> <p>Decentralising monitoring responsibilities</p> <p>Up-skilling miners to monitor health, safety and environmental practices</p>
Limited danger of sanctions in combination with the possibilities to evade the imposition of the law by corruption	Transparency measures for the ASM sector
Providing incentives requires a level of capacity from government that might not exist	<p>Capacity building for government</p> <p>Public-private partnerships</p>



	Increased advocacy to encourage resources and attention to be directed at ASM
Adapted mainly from Hentschel et al. (2002), Spiegel (2012a) and Veiga et al. (2006), and also citing Andrew (2003); Hilson and Maponga (2004); Maconachie and Hilson (2011); Peru Support Group (2012); Spiegel (2012a), USAID (2010) and Veiga et al. (2006).	

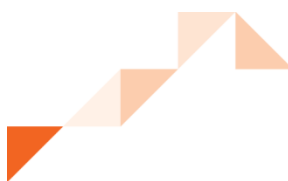
Cooperatives and associations

Encouraging artisanal and small-scale miners to form cooperatives, enterprises or associations is one way that governments have attempted to organise the ASM sector in order to be able to regulate it. It is difficult for governments to govern individual miners, but when there is a cooperative, the head of the cooperative can be held responsible for health, safety and environmental issues, encouraging producers to take up more environmentally and socially responsible activities, such as excluding child labour and rehabilitating mines. Incentives to form cooperatives are often provided in the way of training and knowledge transfer or financial services for legal mining operations. The formation of cooperatives also supports communication, cooperation and coordination between miners, assisting them to share knowledge and resources, and may also contribute towards increasing local beneficiation (Hentschel et al. 2002; Levin & Turay 2008).

In many countries where ASM operates, there are women's mining associations such as the Tanzanian Women Miners Association and the Association of Zambian Women in Mining (AZWM). These groups can be successful in winning valuable contracts. AZWM, for example, won a contract to supply 135 kg of emeralds to a Canadian company in 2011, and similar deals in Asia (2011). Given popular support for fair trade and 'ethical gemstones,' jewellery companies and the enabling environment provided by the internet could open up more of such opportunities for associations of women miners. It is hoped that such networks can address specific issues faced by women in ASM such as health, poverty reduction, family life and training.

Levin and Turay (2008) describe a project funded by USAID in 2005, the Integrated Diamond Management Programme (IDMP), which experimented with a diamond mining cooperative scheme in Sierra Leone to formalise the artisanal sector and increase local benefits. The project was largely based on the premise that traditional middle-men 'supporters' (land-owners and dealers) were a problem, and that eradicating the traditional supporter system would enable diggers to become financially independent and diversify their livelihoods. Unfortunately, the scheme was considered a failure by the investors, USAID's programme evaluators, and development professionals at-large.

There were many issues with the project, including being based on the wrong premise and assumptions from the outset. For example, it was assumed that the miners were

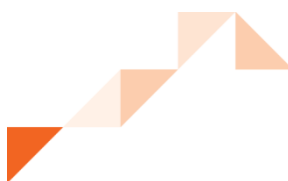


predominantly young men, and a misunderstanding of the relationship between diggers and supporters, which underestimated the level of dependence diggers had on supporters as well as the level of trust between them. Some diggers expressed unwillingness to abandon or jeopardise their relationships with their dealers or supporters, in part because of the important (albeit limited) financial or political assistance they provided in times of trouble. As Levin and Turay (2008, p. 5) conclude: “Trying to eradicate the supporter system without substantial changes in the dynamics of the social and political economy of a diamond digger’s world was therefore naïve and probably futile”.

The program also ended up being similar to the supporter system it was trying to eradicate as it was short-term in nature and funding was eventually withdrawn. As Levin and Turay (2008, p. 5) highlight, “[t]he direct financing scheme only transferred the miners’ obligations from a supporter they knew to one they did not. Additionally, it did not require the miners to share the risks and rewards of the mining operations, as the ownership of production effectively sat with the investor. Its intended emancipatory potential was therefore limited.” Others issues included: inadequate finance; inappropriate selection criteria and guidelines; corruption; inadequate monitoring; poor information flows; lack of democratic procedures; weak capacities and understanding; and beneficiary mentality.

From this project, some key recommendations for future projects aiming to develop a cooperative scheme were put forward (from Levin & Turay 2008, pp. 8-9):

- Ensure that the scheme is as simple as possible and preferably based on existing practices. Extensive consultation is required as well as negotiation and adaptation to local realities.
- Provide capacity building for new cooperatives, with a particular focus on issues of democratic organisation, responsibility, accountability, entitlements and management.
- Ensure proper guidelines and procedures are in place and understood by the members of the cooperatives.
- Empower cooperative members to manage their own affairs and finances with clear accountabilities.
- Provide adequate, timely financing and a contingency budget.
- Provide technical assistance and training in productive and responsible mining techniques.
- Ensure a monitoring system is in place, including monitoring of mining activities and information flow.
- Manage expectations through appropriate communication and ensure information reaches miners.

- 
- Consider encouraging alternative livelihoods to ensure sustainability of the cooperative if commodity prices drops or production falls.
 - Conduct baseline studies to understand ownership, control and decision-making amongst the target group, compatibility of members, objectives of the target group (including whether they are compatible with program managers and if not how differences in expectations can be reconciled) etc.


Training/capacity building programmes

Adler Miserendino et al. (2013, p. 7) and others (Hilson et al. 2007a; Spiegel 2009; Sousa et al. 2010; Spiegel 2012b; Zolnikov 2012) emphasise the importance of “multi-stakeholder educational outreach and training activities targeted towards both miners and community members”. Education and training is the cornerstone for promoting formalisation of the sector, as well as creating awareness of health and safety hazards (e.g. mercury), and minimising the environmental impacts of ASM (Aryee et al. 2003). A number of mining ministries in sub-Saharan Africa have dedicated ASM departments or directorates (e.g. Nigeria, Tanzania and South Africa), some of which, like the Ministry of Mines and Steel Development of Nigeria, facilitate training for ASM operators in areas such as health and safety, financial management or the acquisition of mineral titles.

Unfortunately, according to Hinton et al. (2003, p. 108), the amount of money and effort spent on the education of miners is considerably lower than those of other approaches, such as enforcement and monitoring (Hilson 2006). There is also a tendency of governments and donor bodies to promote education within more established ASM regions, leaving a need for training and capacity building programs in more remote communities (Hilson 2006).

The following case study shows how training programmes organized by international donors and multilateral organisations can be successful if they effectively share information with and between artisanal and small-scale miners, using participatory strategies and training techniques such as train-the-trainer (Sheldon 2013).

Between 2003 and 2011, the World Bank funded the Uganda Sustainable Management of Mineral Resources project, which comprised an outreach and training program and a small grants program. The training program was developed through highly participatory consultations across a wide range of stakeholders, including artisanal miners, their communities, mining-industry executives, and local and central government officials. The training covered a wide range of ASM-related topics, including mining methods, legal and regulatory issues, business skills, occupational safety and health, and community development. It was delivered to 200 local government officers, local leaders, miners’ leaders, and NGO staff. The materials used in the training included a comprehensive ASM handbook, a toolkit for baseline studies of ASM in mining areas, and a facilitators’ guide for community-based training workshops. A two-week train-the-trainer program was also



developed and delivered to over 180 stakeholders from strategic mining districts. These trainers subsequently trained over 1,000 miners (including 40% women) (Sheldon 2013, p. 12).


The project led to the formation of 50 ASM associations to enhance production and marketing efforts, with some operating so successfully that they came to form joint ventures with international mining companies. According to Sheldon (2013) the training resulted in significant livelihood improvements for the miners, including increased profits due to greater awareness of market prices and the pooling of individual production. Revenues are also now being used towards savings and investments in other businesses. In addition, several miners' groups founded Village Savings and Loan Associations to provide security for members through small loans that they could use to pay for housing, school fees, or family emergencies. Miners also enjoy improved working conditions and occupational safety—e.g., supporting shafts with timbers, wearing dust-masks, and not undercutting pit walls in stone quarries. The ASM training also raised awareness of the need for proper disposal of human waste, restoration of mining sites, and growing trees for firewood used in kilns.

As the above case study shows, formalised peer learning can be a particularly effective method for training artisanal and small-scale miners. In addition, the education levels of the target audience need to be taken into account, including language and literacy levels: “sophisticated training exercises, perhaps appropriate strategies for literate mining populations, are inappropriate in locations characterized by high levels of illiteracy” (Hilson et al. 2007a, p. 279). For this reason, radio is said to be another effective medium for disseminating information to artisanal miners (Hilson et al. 2007a). The Nigerian Ministry through its dedicated ASM department conducts a sensitization program where women in particular are made aware of dangers of children's involvement in mining. This program involves drama presentations at village squares, radio jingles, and billboards.

Technical support and assistance

There is a widespread lack of knowledge among miners of the benefits of adopting more efficient and environmentally sustainable technologies in their operations (Aryee et al. 2003). This is particularly the case for illegal small-scale miners, who tend to be excluded from technical extension support programs. However, implementing technical strategies requires “detailed knowledge of the cultural, social, economic and organisational context of the miners” (Hentschel et al., 2002: 47).

Capacity building and technology transfer programs have been a strong focus of multilateral lending agencies such as the World Bank and Intergovernmental organizations such as the United Nations Environment Programme (UNEP), the United Nations Development Programme (UNDP), the United Nations Industrial Development Organization (UNIDO), and the United Nations Institute for Training and Research



(UNITAR) (Aryee et al. 2003; Sippl & Selin 2012). These programs tend to focus on more efficient mining and processing methods to reduce environmental damage and mercury pollution. For example, the World Bank recently funded an initiative in Tanzania that provides small grants to state institutions like the Geological Survey, universities, and vocational training institutions that can be used to establish an equipment leasing scheme and set up technical advisory services (Fold et al. 2013).

According to Sippl and Selin (2012, p. 21), in the 1970s and 1980s, international capacity-building and technology-transfer programs had a tendency to be “characterized by experts from northern industrialized countries spending short periods of time in southern developing country communities to conduct training and introduce new ideas and systems, then going back home again with few continuing connections or commitments”. Many of these activities failed to have real impacts because they were short-term in nature and failed to take into account local contexts. In Ghana for example, poor understanding of the make-up and dynamics of small-scale mining communities has led to the design of many inappropriate technologies and support services (Hilson & Potter 2003; Hilson 2006; Banchirigah 2008). This has continued to be an issue. According to Hilson & Potter (2003), in the mid-1990s, World Bank and other international funds were used to purchase equipment that was either not suitable for small-scale miners or that small-scale miners did not know how to use and was not accompanied by appropriate sensitisation and training programs. Other equipment provided more recently has been received positively, but it is unlikely to be affordable enough for miners to retain and maintain (Aryee et al. 2003).

Assistance centres

In Ghana, the Minerals Commission has established seven small-scale mining district centres located close to small-scale mining areas, which are reportedly staffed by experienced mining engineers who provide technical extension services including information sharing, the provision of advice, and assistance and training in best practices for mining, processing, marketing, environmental sustainability, health and safety (Aryee et al. 2003; United Nations 2009). These centres should also serve as an initial point of contact for any individual or group of individuals wishing to acquire a license for small-scale mining (Aryee et al. 2003). However, there are reports that these centres have been under-resourced by the government and as such unable to provide necessary information and training facilities (Hilson 2003). The Nigerian Ministry also has dedicated extension services outposts for artisanal gold miners.

Strategies focused on mercury

Mercury has toxic effects on the human nervous, digestive and immune systems, and on lungs, kidneys, skin, eyes, and the brain. It causes neurological damage to children in



utero and early in life (Veiga et al. 2006; WHO 2013). While the use of mercury in mineral processing is actually illegal in many countries, mercury amalgamation is the preferred and most common method of extracting relatively fine gold from ore in ASM (Veiga et al. 2006). When mercury comes into contact with gold particles (in sediments or crushed ore), it forms an amalgam, which is then heated to evaporate the mercury, which leaves the gold behind (UNEP and Artisanal Gold Council 2012).

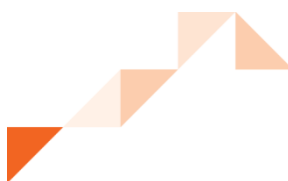
UNEP and Artisanal Gold Council (2012, pp. 10-1) outline the steps in extracting gold using mercury as follows:

1. Rocks or sediment containing gold are mined.
2. If necessary, the ore is crushed to liberate gold particles.
3. Frequently, the gold bearing material is concentrated to reduce mass.
4. Mercury is added to extract the gold by forming an amalgam (mixture of mercury and gold).
5. Amalgam is collected and heated, evaporating the mercury, and leaving a porous 'sponge gold' product.
6. 'Sponge gold' is melted to produce solid gold doré.
7. The doré is refined in gold shops to 24K and traded internationally.

This process releases mercury in two forms – metallic mercury, which is discharged into the environment (air, water and soil) and released through burning, and mercury vapour, which is inhaled (Tschakert & Singha 2007; UNEP and Artisanal Gold Council 2012). ASM is the biggest source of mercury pollution to air and water globally, and is second only to coal combustion in terms of anthropogenic sources of mercury emissions to the atmosphere (Kessler 2013; UNEP 2013a). The supply of mercury is a key issue in managing its use and negative impacts. While import of mercury is generally banned for use in ASM under domestic law, mercury is often acquired legally for other uses, including dental amalgam, and is then sold to miners (or given in exchange for gold) (Sippl & Selin 2012). As a result of mercury mine closings and export bans by the European Union (2011) and the United States (2013), mercury is increasingly coming from other places (Sippl & Selin 2012). According to Veiga et al. (2006), only four nations (Spain, Kyrgyzstan, China, and Algeria) have had large, dedicated mercury mines in operation in recent years.

Mercury is used in the process of extracting gold from ore for a number of reasons (adapted from Binali 2012; UNEP and Artisanal Gold Council 2012):

- Quick and easy
- Independent - it can be used by one person independently
- Effective at extracting gold at most ASM sites
- Typically very accessible
- Cheaper than most alternative techniques

- 
- Facilitates precise transactions and divides profits – between labourers and owners for example
 - Miners are not always aware of the aware of the risks of mercury
 - Miners have no choice – even when they are aware of the risks of mercury, miners might be instructed by their superiors to use it, or might not have the capacity or capital required for alternatives
 - It is one method that permits custom processing of small individual ore batches - often an important socioeconomic structure.
 - Mercury is most commonly used when simple gravity methods cannot produce concentrates greater than 10-20% gold.

Some methods to reduce mercury emissions include (Zolnikov 2012):

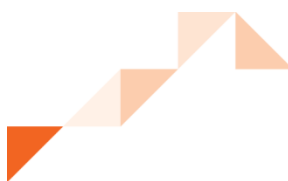
- Buyer impact recognition (e.g. Fair Trade, Standards & Certification Initiatives);
- Risk assessment exposing a cost-benefit analysis of mercury use;
- Public health awareness campaigns;
- Education of miners on the hazards of mercury exposure and ways to minimise exposure; and
- Alternative processing techniques (see below for a discussion of Centralised processing centres, Retorts and Clean/No-mercury technologies).

The international community has focused on the use of mercury as a key problem in ASM since the early 1990s (Sippl & Selin 2012). Two key international initiatives aimed at addressing mercury use in ASM include The **Minamata Convention on Mercury** (see below for further information) and the Global Mercury Project run by the Global Environment Facility (GEF), United Nations Development Programme (UNDP) and United Nations Industrial Development Organization (UNIDO) from 2002-2007 (Spiegel & Veiga 2010; Veiga et al. 2014).¹

UNIDO (2013a) currently has six ongoing projects financed by the Global Environment Facility (GEF):

1. Improve the health and environment of artisanal gold mining communities by reducing Mercury Emissions and Promoting Sound Chemical Management in Burkina Faso, Mali and Senegal
2. Implementing integrated measures for minimizing mercury releases from artisanal gold mining in Ecuador and Peru

¹ For more information about the Global Mercury Project see: <http://www.unido.org/en/what-we-do/environment/resource-efficient-and-low-carbon-industrial-production/watermanagement/mercury/global-mercury-project.html>

- 
3. Improve the health and environment of artisanal gold mining communities in the Philippines by reducing mercury emissions
 4. Reduce Mercury Emissions and Promote Sound Chemical Management in Zinc Smelting Operations in China
 5. Reduce the impacts of mercury on human health and the environment by promoting sound chemical management in Mongolia
 6. Preparatory project to facilitate the implementation of the legally binding instrument on mercury (Minamata Convention) in Argentina to protect health and the environment

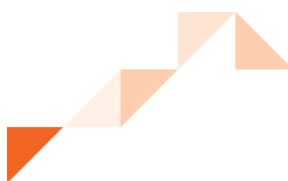
Minamata Convention on Mercury

The Minamata Convention on Mercury is a global treaty to protect human health and the environment from the adverse effects of mercury. It was agreed upon in January 2013 and open for signing in October 2013 (Kessler 2013; UNEP 2014). To date 99 countries have signed and only one, the United States, has ratified the convention. The Convention contains compulsory and voluntary measures to control mercury emissions from different sources and to phase out its use in products and industrial processes as well as restrict its trade (Kessler 2013). Key components of the Minamata Convention include (UNIDO 2013b):

- Ban on new mercury mines and phase-out of existing ones;
- Ban of production, export, and import of a range of mercury containing products by 2020;
- Phase-out or reduction of manufacturing processes using mercury or mercury compounds;
- Control measures on air emissions and releases to land or water;
- Sound management of mercury wastes and contaminated sites; and
- National Action Plans for the ASM sector. (UNIDO 2013b).

According to a senior environmental analyst with the Natural Resources Defense Council (Kessler 2013), the approach of the convention to direct countries to develop their own plans to reduce or eliminate mercury in mining was a positive decision. The convention allows for the continued trade of mercury for ASM and does not have a phase-out date for the practice (Kessler 2013). Guidelines for the national action plans, which will be a requirement for signatories where ASM is “more than insignificant”, include the following (reproduced from Annex C of UNEP 2013b, pp. 59-60):


- a. National objectives and reduction targets;
- b. Actions to eliminate:
 - i. Whole ore amalgamation;
 - ii. Open burning of amalgam or processed amalgam;

- 
- iii. Burning of amalgam in residential areas; and
 - iv. Cyanide leaching in sediment, ore or tailings to which mercury has been added without first removing the mercury;
 - c. Steps to facilitate the formalization or regulation of the ASM sector;
 - d. Baseline estimates of the quantities of mercury used and the practices employed in artisanal and small-scale gold mining and processing within its territory;
 - e. Strategies for promoting the reduction of emissions and releases of, and exposure to, mercury in artisanal and small-scale gold mining and processing, including mercury-free methods;
 - f. Strategies for managing trade and preventing the diversion of mercury and mercury compounds from both foreign and domestic sources to use in artisanal and small scale gold mining and processing;
 - g. Strategies for involving stakeholders in the implementation and continuing development of the national action plan;
 - h. A public health strategy on the exposure of artisanal and small-scale gold miners and their communities to mercury, which should include the gathering of health data, training for health-care workers and awareness-raising through health facilities;
 - i. Strategies to prevent the exposure of vulnerable populations, particularly children and women of child-bearing age, especially pregnant women, to mercury used in artisanal and small-scale gold mining;
 - j. Strategies for providing information to artisanal and small-scale gold miners and affected communities; and
 - k. A schedule for the implementation of the national action plan.

Centralised processing centres

Centralised processing centres for ASM arose in the 1990s (Veiga et al. 2014). As the ASM sector grows, so does the number of processing centres. The first processing centres were established in Ghana, Venezuela and Zimbabwe, by governments and other project funders (e.g. NGOs and international donors such as the World Bank), in an attempt to reduce unmonitored panning activities and reduce discharges of mercury into rivers (Hilson et al. 2007a; Veiga et al. 2014). As well as providing processing facilities, the centres also serve a role in the provision of information education about cleaner production (Hinton et al. 2003b).


According to Veiga et al. (2014), processing centres around the world follow more or less the same model: they provide miners with a means of extracting a percentage of gold from the ore they have mined using rudimentary techniques that involve the use of mercury. They take the tailings as payment, which they then process with cyanide to extract the remaining gold before discharging the tailings into the environment. Because



gold recovery using mercury amalgamation is less than 40%, processing centre owners profit by reprocessing amalgamation tailings left behind by artisanal miners. They use more refined techniques including cyanidization, flotation, and smelting to recover the remaining 60%–70% of gold (Adler Miserendino et al. 2013 citing Velásquez-López et al. 2010). In some countries or regions, however, for example Peru, ore might be processed very far from mine sites, due to lack of knowledge in processing techniques, lack of resources to acquire processing equipment, and lack of water and power in some regions (Veiga et al. 2014). In these situations, miners would receive immediate payment (at 40–50% of value of gold in the ore) for ore (Veiga et al. 2014).

Key challenges of processing centres include the following:

- According to Hilson et al. (2007a, p. 277), centralized processing facilities are “effective solutions in countries with localized gold deposits” but “have proved unsustainable where activities are comparatively more chaotic and gold is widely dispersed”. Processing centres may not be a viable solution where they require miners to haul many tonnes of ore much beyond the mine (Siegel 2007).
- High demand for processing centres often supersedes their capacity in some countries or regions, discouraging miners from using the centres due to lengthy waiting times or encouraging the prioritisation of miners with large amounts of ore, which disadvantages smaller producers (Hilson & Pardie 2006; Hilson et al. 2007a; Veiga et al. 2014).
- Processing centres may also be underutilised (Hilson et al. 2007a). Miners might not be aware of the merits of using the processing centres – in many cases in sub-Saharan Africa, centralised services have been installed before ensuring that there is a demand and willingness to use them (Hilson 2007). For example, a World Bank-sponsored ore-processing centre in Bolgatanga, Ghana, constructed in 2000, was underutilised because it was too far away from the mining area and the equipment wasn’t tailored to local geological conditions due to lack of research prior to establishment (Hilson et al. 2007a). Research had not undertaken before construction to determine the mesh size needed to facilitate high gold recovery rates, and so many miners believe that their own methods were more efficient.
- Owners/operators of processing centres have disproportionate influence and coercive power over miners. Miners have to accept less efficient processing techniques, which may extract less than 30% of gold from their ore (Veiga et al. 2014).
- Processing centres operating on an aid rather than business model may offer services free to miners for a period of time, but may not be sustainable once the project finishes – they require resources for labour, equipment, maintenance, and administration (Siegel 2007).
- Processing techniques in the centres can be time-consuming and gold recovery low (Veiga et al. 2014).

- 
- Centres rarely use clean or efficient techniques in processing the miners' ore – the process can be highly polluting (Veiga et al. 2014). The main pollution problems identified by Veiga et al. (2014) are:
 - Lack of cyanide management (both use of and disposal)
 - Amalgamation of the whole ore, resulting in increased mercury losses with tailings
 - The use of cyanide to extract residual gold from mercury contaminated tailings
 - Tailing disposal with mercury, other heavy metals and cyanide
 - Decomposition of mercury amalgams without any recovery method of filter.


According to Veiga et al. (2014), in Ecuador some improved technologies have been introduced, such as flotation techniques that concentrate fine gold and copper sulphides (which are then sold to smelters in Peru or China rather than processed with mercury or cyanide at that processing plant) or the treatment of cyanide tailings with hydrogen peroxide. Engineers in Ecuador have also devised techniques to collect processing tailings in a pipeline to dispose in a formally constructed tailings dam located at a safe distance from the river (Veiga et al. 2014, p. 543). While the situation in Ecuador is still not ideal, as most processing centres still dump mercury and cyanide into rivers, it provides some best practices examples and shows the importance of investment in ASM as a way of encouraging more environmentally responsible practices:

“The evolution witnessed in the southern Ecuador is occurring thanks to strong investment of the private sector. This is also due to international training co-operation efforts, active participation of miners in the decision making process and more presence of the government in the mining sites. Finally, the involvement of good local technical people interested in the small mining business is making the greatest difference. The Ecuadorian Government is largely investing in the process of organization training and formalization of the miners as a way to improve the working conditions and quality of life of the mining communities.” (Veiga et al. 2014, p. 543).

Mercury retorts

Mercury retorts are “enclosed systems assembled with a crucible connected to a condenser, designed so that mercury from gold amalgam evaporates when heated. The logic behind their use is that amalgam, if distilled within an enclosed circuit, is not released into the environment” (Hilson & Pardie 2006, p. 112 citing Hinton et al. 2003a). There have been some issues with adoption of the retort, despite a number of international programs focused on promoting their use.

According to Hilson et al. (2007a), earlier attempts to introduce retorts in Africa occurred in Zimbabwe and Ghana during the 1990s and were promising. In both cases, the



equipment was crafted using local materials and/or material with which operators were familiar. However, there was concern among miners about the use of opaque metal in the designs, which prevented them from ‘viewing’ the amalgamation process. As a result, these initiatives were abandoned after the pilot exercises. However,


“[r]ather than working with populations to modify these retorts, however, the [Global Support Facility]— specifically, officers at UNIDO – hastily put forward plans to design what they claimed to be a more appropriate device to be implemented in Ghana and Tanzania. The Munich-based company, Metall-Technic, was soon commissioned to design the ThermEx® glass retort so that ‘...miners can inspect the condensation process...[and]...observe mercury being released from the amalgam and condensed...[to]...trust that all the gold is recovered in the process’” (Hilson 2007 citing Veiga, 2004a, p. 30).

Unfortunately, there were additional problems with this retort:

- High price: “the ‘recommended selling price’ of the ThermEx® retort is US \$520, which amounts to more than the majority of small-scale miners’ annual incomes; in Ghana, the subsidized rate of 500 000 cedis (US\$50) is also well beyond the financial means of the majority of artisanal miners” (Hilson 2007, p. 244).
- Low capacity for gold production;
- Longer burning time (Bosse Jønsson et al. 2013);
- Breakability: the retort is made of glass and such is too delicate for the environments that miners work in;

For non-glass retorts constructed using local materials, there have also been complaints from miners that gold was discoloured after using the retort as well as the quantity of needed to heat the retort (Bosse Jønsson et al. 2013).

Some more successful examples of locally constructed retorts and processing devices can be found. For example, a pilot project in Mozambique fabricated retorts using local materials. Training workshops introduced the homemade retorts, and a portable mercury monitor revealed effective mercury reduction. The retorts were made easily and inexpensively using local supplies in two towns, or by fabricating equipment and materials not available off the counter. The total cost of making one kitchen-bowl retort (metallic) was US\$3.30 and one homemade pipe retort was US\$4.80. The miners’ association with whom the pilot was undertaken, representing 3,764 miners in the area, agreed that the solutions brought to them were beneficial, reasonably inexpensive considering the economic benefits gained from being able to re-use mercury, and easy to implement. Trainers chosen by the association proceeded to promote this solution to other miners (Spiegel et al. 2006). In another example from Papua New Guinea, Hilson and Pardie (2006 citing Crispin 2003) describe a retort constructed using scrap tin which is very common due to the high consumption of tinned fish:



The “tin fish tin” model features a small tin (the top removed), in which the amalgam cake is placed. A second larger tin is placed atop the first tin, the dish is filled with damp ashes or sand, and is subsequently placed over a fire. The mercury becomes trapped in the damp sand, is panned out, and can be reused (Hilson & Pardie 2006, p. 114 citing Crispin 2003).

According to (Sippl & Selin 2012, p. 25), while companies, universities, civil society organisations and government aid agencies have manufactured and distributed retorts in the past, manufacturing retorts locally and could provide an opportunity for the employment of former miners and mercury dealers. The authors also highlight the need for accompanying training on the proper use of new technologies such as the retort, which could also be provided locally to encourage its adoption. They provide an example from Tanzania where two community leaders had difficulty using their retorts, which discouraged their use amongst community members. In another example, miners in a number of locations took the retort lids off too early, which would let the majority of mercury escape, showing how important it is for new technologies to be properly understood and used by miners themselves.


Clean/No-mercury technologies

Transitioning to mercury-free mining is easier in cases where gold deposits are alluvial (particles from riverbeds) as opposed to veins underground, as alluvial ores are most amenable to low-cost, mercury-free methods such as traditional gravity concentration and panning. (Sippl & Selin 2007, p.26) (Hilson et al. 2007a). Cyanide leaching is the mercury-free method used by large-scale mining firms, but is out of reach for most ASM operations due to the high infrastructure costs (Hilson et al. 2007a).

There are some government-led partnerships to transfer low- to no-mercury technologies into the ASM sector (Hinton et al. 2003b). For example a project called ‘Safer mining’ is ongoing in Zamfara State in Nigeria where the government is providing IGOLI plants (a mercury free system of extracting gold which consists of leaching the gold concentrate with dilute hydrochloric acid and bleach and precipitating gold with sodium metabisulphite) (MINTEK 2011b).

According to Hinton et al. (2003b), past efforts to develop and implement clean ASM technologies have shown that in addition to taking into account community-specific conditions, appropriate clean technologies must satisfy the following criteria:

- Economically beneficial: the technology must be inexpensive to operate and it must generate obvious financial benefits.
- Simple: the technology must be easy to use and would ideally utilize readily available resources.
- Expedient: the economic mineral must be efficiently recovered.



As Bosse Jønsson et al. (2013, p. 66) assert, there is no “silver bullet” to replace mercury use in ASM. However, there are a number of alternatives showing promise and the rising price of mercury might accelerate their development and adoption amongst miners. Certainly, the adoption of new extraction methods will depend on them being relevant to the local context and ore body, the financial resources of miners, skills and access to infrastructure (Bosse Jønsson et al. 2013). The UNEP and Artisanal Gold Council publication *Reducing Mercury Use in Artisanal and Small-Scale Gold Mining: A Practical Guide* (UNEP and Artisanal Gold Council 2012) is a good resource intended for policy makers, miners and civil society to learn about technologies and approaches for reducing and eliminating mercury use in artisanal and small-scale gold mining (ASGM).


Financial assistance

ASM is typically undercapitalised; small-scale miners often “experience a lack of capital needed to allow even rudimentary production efficiencies and, often, resultant debt bondage and poverty traps, which prevent them from achieving little more than using a day’s earnings to feed themselves and their families” (AngloGold Ashanti 2006). Operators are often in a double bind when it comes to obtaining finance in Africa, Asia and in Latin America. The fact that they are often not registered and considered to be acting outside of the law has made it difficult to obtain credit either from lenders or the government. They also lack business networks and marketing knowledge, which prevents them from obtaining fair prices for their commodities (Andrew 2003). Yet financing is required if they are to reach a size where it is possible to be registered. Most do not have business skills to develop a business plan, and there is a need for training in this area for miners to be able to move from artisanal mining to a level of small-scale mining where they can access credit, for example the New Africa Mining Fund.²

According to Banchirigah (2008), indebtedness is an issue that applies primarily to pit owners (as opposed to the washers, diggers and haulers who they employ and pay a daily wage), because they are dependent on the quantity of economic ore obtained, which is limited due to low productivity, inadequate investment, limited mineral resources, and the use of inadequate or inappropriate technology. Because pit owners operate illegally, they often secure financial support through informal and inequitable channels, causing them to enter a cycle of indebtedness.

Recently in Ghana, the Minerals Commission has provided microcredit to a number of projects. Hilson (2011) gives a detailed analysis of one relatively successful microcredit project in Northern Ghana for ASM operators. This provides a possible blueprint for future microcredit projects, particularly for women. Hilson believes that government can provide credit to ASM and that this project succeeded because it respected principles that have made Grameen bank successful: social collateralization, i.e. money is lent to groups of

² Refer to: http://ifcext.ifc.org/ifcext/spiwebsite1.nsf/ProjectDisplay/SPI_DP29060



people who are more likely to pay a loan than individuals; devolved responsibility to borrowers; and borrower discipline (Hilson & Ackah-Baidoo 2011).

In Nigeria, the small grants program for artisanal and community based miners, funded under the World Bank's Sustainable Management of Mineral Resources Project (SMMRP) which ran from December 2004 to May 2012, supported almost 300 projects aimed at improving the productivity, safety and working conditions, and livelihoods of the beneficiaries (World Bank 2012b).

Siegel and Veiga (2009) discuss government loan facilities aimed at the ASM sector, using the examples of Namibia and Mozambique:


“In Namibia, the government used a Minerals Development Fund to provide US\$92 million in loans for projects emphasizing the sinking of shafts, exploration, and mine expansion. Using low interest rates, slow payment period, and minimal bureaucratic overhead, 92 percent of loans have been repaid. A similar fund in Mozambique offered financing, provided that miners could show a license, proof of collateral (20 percent of loan amount), a feasibility study, and plan for loan repayment”(Siegel & Veiga 2009, p. 55).

According to Siegel and Veiga (2009, p. 55), development agencies can also address the gap of missing capital by developing government loan facilities, “in effect, carrying the risk of lending money to miners”.

Establishment of funds to assist organised ASM groupings – e.g. cooperatives and associations – as well as to cover the costs of environmental or social impacts have been a recent consideration of multilateral lending agencies such as the World Bank. Funds to meet the cost of environmental sustainability can also be raised by ASM producers through direct taxes and fees or indirect costs incorporated into production costs functions (Aryee et al. 2003).

Fair Trade, Standards & Certification initiatives

There have been several initiatives developed in an attempt to create fairness and transparency in several stages of the mineral commodity chain. One initiative is Oro Verde (Green Gold), a local certification scheme created in 1999 in the Chocó bioregion of Colombia, which incentivises miners to employ environmentally responsible practices for a premium on the price of the gold they produce (Cook & Healy 2012; Sippl & Selin 2012). This initiative, which was formed through an alliance of local community groups and the Environmental Research Institute of the Pacific, won the UN SEED award for promoting sustainable development in 2009, and has propelled a worldwide fair-trade movement around responsible small-scale mining (SEED Initiative ; Sippl & Selin 2012). For example, the Alliance for Responsible Mining (ARM) and Fairtrade International (FLO) jointly



developed the Fairtrade & Fairmined standard over a number of years and sold the first Fairtrade & Fairmined gold in 2011 in the United Kingdom. The aim of the Fairtrade & Fairmined standard was to create market access for gold products that support the social, environmental and economic development of ASM communities (ARM 2013b). In 2013, the formal partnership between ARM and Fairtrade International ended, and the standards and label were separated.


Additional standards and certification schemes relevant to ASM include the following (ARM 2013a):

- Solidaridad: A Dutch NGO working in nine regions worldwide to create fair and sustainable supply chains.
- Responsible Jewellery Council: An international not-for-profit organisation bringing together over 260 member companies across the jewellery supply chain.
- Fair Jewellery Action: promotes ethical and fair trade jewellery business by advocating traceability and transparency in the jewellery supply chain.
- Kimberley Process: a joint initiative with government, industry and civil society participation that aims to stem the flow of conflict diamonds. This initiative was established in 2003 as a response to the use of rough diamonds by rebel movements to finance wars against governments.

While these initiatives represent a step in the right direction, Hilson (2008) criticises the fair trade model because of its focus on facilitating increased interaction between retailers (Western jewellers) and producers (artisanal miners) based on the fair trade model as it has been applied to other commodities such as coffee, tea, bananas and cocoa. Because gold derived from ASM in Sub-Saharan Africa does not necessarily supply Western retailers but is actually an important source of foreign exchange for host governments, he argues that the model should be adapted to focus on host governments, rather than Western retailers as the ‘end consumer’ (Childs 2008; Hilson 2008). In addition, he stresses that the focus of fair trade programmes should be “improving governance at the grassroots, organizing informal operators into working cooperatives, and addressing complications with purchasing arrangement”. Adler Miserendino et al. (2013) also question the ability of consumer-based pressure to address the impacts of ASM due to its tendency to be driven by a need for immediate profits.

Beneficiation of resources

The term beneficiation refers to the process of refining an ore, or separating the valuable material of an ore from the waste material (CSIRO 2011). The term has also become a synonym of ‘value-addition’, referring to the transformation of a mineral (or a combination of minerals) to a more finished product which has a higher sales value (Department of Mineral Resources 2011b). In the case of gold, diamonds and gemstones,



beneficiation can be extended to include polishing and faceting of stones and the creation of jewellery. If some of the processing of minerals can be kept in country, for example in the form of gemstone processing and jewellery making, there are clearly some opportunities for employment and capacity building of local people.

Many national governments in sub-Saharan Africa have policies encouraging the beneficiation of precious minerals. South Africa for example, has developed a beneficiation strategy (Department of Mineral Resources 2011a), which has led to promising initiatives such as the Small Enterprise Development Agency (SEDA) Platinum Incubator, South Africa's first platinum beneficiation incubator for the design and manufacture of jewellery (Seda Platinum Incubator 2014), and the South African national mining research organisation MINTEK, which has a Small Scale Mining and Beneficiation Division (MINTEK 2011a). Ghana's Precious Minerals Marketing Corporation (PMMC) – the corporation owned by the government which was set up to purchase gold and diamonds from small-scale miners when ASM was legalised in 1989 – has established a jewellery-manufacturing wing to enable the corporation to manufacture jewellery for local and export markets (Aryee et al. 2003).³ The Malawian Government also has the following policy statement: “government will promote investment in downstream value-addition of minerals in the country for instance cutting and polishing of gemstones and production of jewellery” (Malawi Ministry of Mining 2013).

There are also numerous examples of private entities focused on in-country beneficiation and many firms are now interested in promoting their jewellery as containing metals and stones that are ‘ethical’, fair trade, and women friendly (Choyt 2014). For example, GEMSTYLES is a Tanzanian company committed to women in mining and the alleviation of poverty. They are faceting gems and making jewellery in the country (Fair Trade Silver n.d). The Association of Zambian Women in Mining (AZWM) also has women working in processing rough stones and jewellery making. AZWM has even opened up to the tourist market with guided tours being offered to their aquamarine mine (Amazing Zambia 2010). American companies such as Brilliant Earth provide sponsorships for training in lapidary in Madagascar.

For beneficiation endeavours to be viable for ASM, training in lapidary and jewellery making skills and appropriate equipment is needed. In Amhara state in Ethiopia, training in lapidary skills and provision of equipment by the Ethiopian Government and UN Women has enabled women to process opals providing a source of foreign income to the country. There are also lapidary colleges set up by the Ethiopian and Zambian governments. In addition, the World Bank has sponsored lapidary and jewellery making courses through the Ministry of Mines in Ethiopia. Although beneficiation could represent a viable livelihood strategy for rural communities, the real impact of these activities on poverty and people's lives remains to be demonstrated.

³ For more information see: <http://pmmcghana.com/jewelleryshop/>



Intersection of ASM with large-scale mining

The interactions between artisanal and large-scale mining have become more contentious in the last several years. Conflicts between these two sectors have primarily stemmed from ASM activities occurring illegally on large-scale mining concessions. In fact, the presence of ASM may provide an important geological indicator for large-scale mining (Aubynn 2009), so the two activities are naturally prone to intersecting.

Some ASM activities, such as poor health and safety practices, the use of child labour, environmental damage, illegal activities and human rights abuses can pose liabilities and reputation risks for large-scale mining companies when they occur on the company's concession (ICMM 2009b). Environmental damage from ASM activities can be incorrectly attributed to a large-scale mining activities, leading to financial liabilities for the company as well as reducing community support for the project (ICMM 2009b). Artisanal and small-scale miners can cause damage to a large-scale mining company's assets, either directly through vandalism and other acts of resistance to the large-scale mining company's presence, or because their activities encroach on large-scale activities. Confrontations between artisanal and small-scale miners can also pose safety risks for both parties. Security forces employed by both companies and governments to look after assets have been accused of being involved in human rights abuses against artisanal and small-scale miners in a number of locations around the world.


The International Council on Mining and Metals (ICMM 2009b) publication *Working together – how large-scale miners can engage with artisanal and small-scale miners* provides useful approaches and tools for companies to engage with ASM.

Geological information and demarcating areas for ASM

A major challenge in many countries is the lack of geological information indicating mineralized areas for ASM concessions:

“...few developing world governments possess detailed geological maps in forms easily understood by small-scale miners and suitable as reference points for determining areas appropriate for ASM. This can lead to the demarcation of poorly-mineralized concessions” (Hilson & Maponga 2004, pp. 22-3).

This has led to substantial environmental and financial liabilities, as miners operate in a haphazard manner. In addition, inappropriate concessions are often awarded to artisanal and small-scale miners, some with very low concentrations of or inaccessible minerals (Aryee et al. 2003; Hilson & Maponga 2004; FoN 2010; Hilson et al. 2014). According to FoN (2010, p. 3):




“As a result most miners carry out ad hoc operations, largely by guesswork and trial and error resulting in investment losses for small-scale miners, low mineral recovery and low government revenue. Consequently, most of the legally registered small scale miners leave their concessions and operate illegally on concessions of larger mining companies”.

According to Siegel and Veiga (2009, p. 55), because many countries have encouraged investment by large-scale mining companies as a key development objective, ASM has remained largely “illegitimate and undercapitalised”. Large-scale operators are generally given preference in the allocation of mining licenses, which further restricts the land that artisanal and small-scale miners can operate on (AngloGold Ashanti 2006). For example, by 2006, 13.1% of Ghana’s land area was under concession to mining and mineral exploration companies, including 70% of Tarkwa and two thirds of Wassa West District (Banchirigah 2008). A number of concessions demarcated to large-scale mining companies have mineral deposits that are uneconomical to extract on a large scale, but which would be appropriate for ASM (Banchirigah 2008). According to Banchirigah (2008), the Minerals Commission of Ghana has made some progress toward facilitating the release of sections of large-scale mining concessions for ASM activities in some regions. Central to this initiative was the inclusion of a provision in the revised *Minerals and Mining Act 2006* to permit the transfer of mining titles (not permitted under the previous mining law), systems that already existed in countries including Tanzania and Zimbabwe (Hilson et al. 2007a; Banchirigah 2008). However, there are other mining ‘hot-spots’ where large-scale mining companies have refused to relinquish sections of their concessions to ASM (Banchirigah 2008).

Aryee et al. (2003, p. 138) discuss measures funded by World Bank Credit under their Mining Sector Development and Environment Project. One initiative the authors discuss was focused on “providing better geological information to small-scale miners through the assistance of geologists working in the field to delineate recoverable ore bodies on small-scale mining concessions. Areas identified to have potential for such workings were delineated for licensing to small-scale miners”. However, according to Hilson et al. (2007b), the Geological Survey Department of Ghana,

“has failed repeatedly to provide the government with detailed geological data, a necessary first step towards identifying suitable areas for prospective small-scale miners. This exercise was supposed to commence following the launch of the World Bank ‘Mining Sector Development and Environment Project’ in 1995, under which US\$1.66 million was allegedly given to the Geological Survey Department to develop ‘a program to make better geological information available to small-scale miners through the establishment of teams of geologists trained and equipped to delineate recoverable ore bodies on mining concessions’” (Hilson et al. 2007b).



According to Aryee et al. (2003), large-scale mining companies can also adopt a “tributer system” whereby they allocate portions of their concessions considered uneconomical for large-scale mining methods to artisanal and small-scale miners, who can then sell their winnings to the company. These activities allow large-scale mining companies to monitor the activities of small-scale miners on their concessions, but may be problematic if the small-scale miners abuse the system and do not restrict their activities to the areas allocated to them. As such, it is necessary for the large-scale company to enforce strict rules and guidelines. Hilson and Garforth (2013) give several examples of large scale mining companies allowing ASM on parts of their concessions in Ghana:

- At its Damang mine in the Western Region, Gold Fields has taken a ‘live and let live’ approach towards small-scale miners, allowing them to engage in their activities as long as they do not interfere with company activities (Aubynn 2009).
- In Obuasi, AngloGold Ashanti has supported the Obuasi Municipal Artisanal Miners Association, a group of 10,000 miners with an elaborate managerial structure who are allowed to engage in their activities on a section of the Obuasi concession. This took place after many years of tension and conflict between the mine operator and local community. AngloGold Ashanti has also reportedly collaborated with the Ghana Chamber of Mines and the Minerals Commission to identify areas which are suitable for small-scale mining and to promote the registration of miners concerning operations on these properties (Okoh 2013).
- Newmont Ghana at its Kenyasi lease in the Brong-Ahafo Region, as well as in localities such as Noyem and Ntronang, have been said to have “turned a blind eye” to artisanal gold mining on its lease.

Using the Gold Fields example as a case study, Aubynn (2009) looks at the sustainability of this approach as well as the lessons learned. These include:

- ASM and large-scale mining can coexist, but this requires a pragmatic strategy, including a “process of formalising the relationship and ceding portions of concessions which may be economically viable only to ASM operators” (Aubynn 2009, p. 69) and assistance with organisation and capacity building of ASM operators.
- The strategy is not sustainable as large-scale mining companies may eventually be pushed to work their once-marginal resources.
- Companies can take the lead, but cannot work on their own. A multi-stakeholder approach, which involves governments, civil society, ASM representatives, LSM officers and international development agencies working collaboratively, is recommended.



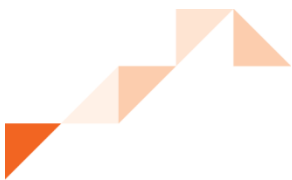
Relocation to demarcated areas

Hilson et al. (2007b) discuss the 'Prestea Action Plan' in the Western Region of Ghana, an initiative to relocate artisanal miners from Prestea to other regions with demarcated areas for ASM. There were a number of issues with the implementation of this plan, which could be applied to other relocation projects related to ASM:

- Communication: The plan was only advertised in newspapers, and the government did not send officials to the Prestea site to announce the relocation. As such, many of the people that signed up for relocation were not Prestea-based miners but supposedly job seekers from large cities who had access to newspapers and took advantage of the plan to be sent to work in mining areas.
- Lack of an adequate time period for relocation to the demarcated areas
- Transportation to the demarcated area: The government did not fund transportation for the mining community to be relocated, expecting that the miners and their families would find and finance their own transport to the demarcated areas, hundreds of kilometres away.
- Lack of housing and services in the demarcated area: The government did not make basic amenities, such as shelter, food, sanitation and healthcare, available in the demarcated areas.
- Lack of engagement with communities: The government failed to engage with the mining communities prior to implementing the plan. It was assumed that because most miners were not native to Prestea, they did not have socio-cultural ties to the area and as such did not consider the socio-cultural ramifications of relocation. However many miners in the area have married locals, built houses, opened shops and have put their children in local schools and did not want to relocate for these reasons.
- Community distrust: Historical persecution by government, harassment by police, and violent confrontations with the security forces of large-scale mining companies meant that many miners in Prestea were skeptical about the government's plan.
- Insufficient deposits of gold at one demarcated site: At one of the demarcated areas, there was concern that there was insufficient gold to sustain an artisanal mining community over the long-term.
- Intensive artisanal mining already taking place at one demarcated site: At another site there were already 300 ASM camps in the area, and an influx of non-native miners was likely to intensify competition for resources and incite conflict.

Technology transfer

A number of technologies and practices used by large-scale mining operations can be downsized to smaller scale operations (Hinton et al. 2003b). Large-scale mining



companies can provide technical assistance to artisanal and small-scale miners, which can be mutually beneficial in cases where a large-scale mining company's reputation is influenced by the presence of artisanal and small-scale miners (ICMM 2009b). Technical assistance programs of this type generally focus on improvements in occupational health, safety and environmental practices; improved mining and processing techniques; facilitation of access to processing plants or markets; or business development assistance (ICMM 2009b). Unfortunately, artisanal and small-scale miners will not always be willing or have the capacity to adopt new technologies and practices. According to Hinton et al. (2003b), new technologies are more likely to be adopted by artisanal and small-scale miners if they are of increased or comparable simplicity, allow for quick recovery of minerals, and can demonstrate financial gain (Hinton et al. 2003b). They should also be accompanied by culturally appropriate sensitisation and training programs.


Land rights/Securing Tenure for miners

Lack of secure land tenure offers little incentive to miners to build their business and infrastructure or undertake environmentally responsible practices. Policies aimed at attracting large-scale mining investment in a number of countries in sub-Saharan Africa have limited the security of tenure that artisanal and small-scale miners can have – licenses may be issued for a period of only 2-3 years and have few or no renewal rights (Andrew 2003). There have been cases of large-scale mining companies being offered the lease of a small-scale mining company after its expiry, with little compensation offered to small-scale miners (Hilson 2003).

The United States Agency for International Development (USAID) Property Rights and Artisanal Diamond Development (PRADD) project in Liberia was premised on the knowledge that strengthened property rights reduce conflict and create positive incentives to good stewardship of the land. (USAID 2013). In addition, ASM often involves elaborate informal and/or customary property systems which should also be accounted for in ASM policy making (Spiegel & Veiga 2010).

Reclamation of lands mined by small-scale miners

There is rarely systematic exploration on lands where ASM takes place, meaning that miners tend to operate on a "trial and error" basis, increasing ASM's negative impacts on the environment (Aryee et al. 2003). The informality or illegality of ASM and lack of planning generally means that little or no effort is made to rehabilitate mined areas (Aryee et al. 2003, p. 136). Miners will sometimes operate at night in an attempt to evade authorities. ASM can leave landscapes devastated. Excavated pits or tunnels may be left unfilled and abandoned, presenting safety risks as they may leave land unstable and at risk of collapsing, or health risks as they fill with water which might be contaminated or become a breeding ground for mosquitoes which pose particular health risks in sub-



Saharan Africa. Aryee et al. (2003, p. 136) describe abandoned ASM sites as “moon-like landscapes consisting of unstable piles of waste, abandoned excavations and vast stretches of barren land.” Not only does the removal of vegetation and land degradation lead to loss of biodiversity, but agricultural lands are also destroyed through the removal of topsoil and disruption of soil structure which leads to erosion (Aryee et al. 2003).

Some countries are implementing schemes aimed at reclaiming lands affected by ASM. For example, a pilot scheme in Ghana was initiated by the Minerals Commission, which rehabilitated and recultivated 205 hectares of land in three different regions that had been affected by gold, diamond, and sand mining. The project, funded by World Bank Credit, aimed to demonstrate that land could be properly reclaimed and used for other economic activities (Aryee et al. 2003). There is also potential for rehabilitation practices of large-scale mining to be passed on to ASM.


Gender-focused strategies

It is difficult to determine accurately the proportion of women working in and contributing to the ASM sector because it is largely informal and unregulated, and women’s roles are often hidden. (Hinton et al. 2003a) estimate that globally, 30% of ASM is undertaken by women, yet depending on the region, it can be much greater (10% to 50% in Asia, 10% to 30% in Latin America, and 40 to 100% in Africa (Eftimie et al. 2012)). In some areas, women comprise a majority of the ASM labour force (up to 74% in Guinea and 50% in Madagascar, Mali, and Zimbabwe (Yakovleva 2007)).

Women work as miners and are also involved in other aspects of ASM, including ore processing, panning, and transporting goods. In addition, they play a critical role in supporting the industry through their activities as shopkeepers and cooks, and they also commonly work as nightclub entertainers and prostitutes in mining areas. Despite their prevailing roles in the ASM sector, women are particularly marginalised in ASM communities and have limited decision-making power; women are also rarely recognised as miners in their own right (McQuilken 2013).

Women can be found at every level of ASM; some women may be mine owners, and some have formed women’s mining associations as in Zambia. However, women’s role in ASM remains constrained by socio economic and cultural barriers. As Tallichet et al. (2003) note, even women mine owners experience gender bias and are forced to use male agents due to men’s reluctance to follow their orders. Women have difficulty obtaining finance from banks and may require their husbands’ consent before obtaining a permit. Women’s capacity to benefit from ASM may also be constrained by de jure and de facto inequity in access to land and property rights.

Women are often excluded from direct contact with more valuable deposits. This may be because taboos forbid them from working underground or coming onto the mine site




when they are menstruating. They typically work in what are considered to be gender-appropriate manual jobs without access to machinery. For example, they are often found working in human chains on the surface or panning, washing, and sieving. This may be carried out on the edges of the fields or in homes or compounds. It is not uncommon to see women working with their children alongside them. Exposure to mercury is commonplace in artisanal gold mining and women are often aggregating and disaggregating gold in confined spaces such as kitchens. The type and value of the commodity being mined may also determine women's roles. In the case of mining for building materials, women can be found undertaking all activities on every part of the lease; on gold leases women will be found digging on the less valuable sections of the lease while men pursue more lucrative seams underground. While women are less typically found underground for a variety of reasons (ranging from taboo and concerns about women's safety), generalisations should be avoided. Hinton (2007) gives examples of women working underground to extract custerite. Women also provide goods and services to artisanal miners and others involved in the commodity chain.

Where women are involved in the sale of minerals, they tend to be involved with less lucrative deals. For example, Malagasy women traders buy and sell the smaller gemstones, and the larger more precious loads are reserved for males acting in concert with other powerful males such as the mayor and the local police chief. This limits women's access to real financial power (Canavesio 2010). Where ASM has been formalised, women working in cooperatives are often paid less than men.

While ASM can be a potential livelihood strategy for women, it is all too often a poverty trap because of concomitant physical hazards and women's social and economic marginalization. Canavesio (2010) describes the tragic situation of women who have gone to the sapphire fields in Madagascar. These women left their homes with high hopes of finding income for their families but they were unsuccessful and did not have the funds to return home.

ASM is associated with devastating health impacts for both men and women, but as work on the ASM fields is often quite segregated, the health impacts are quite specific. Women who spend many hours a day waist deep in water (such as in gold panning and salt mining) are particularly susceptible to impacts on reproductive health. Women are heavily involved in ore processing (up to 90% of processing in Burkina Faso), and because of these activities, their children suffer from exposure to mercury, which can result in neurological damage, and dust, which can lead to asthma or lung disease (Hinton et al. 2006). Women are often involved in reworking tailings, and thus they have more exposure to cyanide.

For ASM to provide a way out of poverty which is worthy of the many hours women are spending on the ASM fields and which does not harm their health, action must be taken. The following categories of initiatives have been suggested (Hinton et al. 2003a; Tallichet et al. 2003):


- 
- Financial support
 - Support for the acquisition of mineral titles
 - Consideration of women in the development of regulations and policies
 - An awareness of health and safety issues, with consideration of children that may accompany their mothers or take part in ASM
 - Gender-sensitive technology assistance initiatives
 - Enhancing the legal capacity of women
 - Enhancing other skills, including managerial and accounting skills.

Research into women miners

There is a dearth of detailed analysis of women's roles in ASM, and more systematic research is needed on their motivations, their skills, the way they learn their trade, the contribution they make to poverty reduction, and the impacts mining activities have on them and their family's health and well-being. While women have gained some social and financial independence from ASM (Harris et al. 2003; Werthmann 2009; Canavesio 2010), and ASM has the potential to lift women out of poverty (Eftimie et al. 2012), the informal nature of ASM means that many women remain in vulnerable positions with limited control over earnings (Buxton 2013) and experience negative impacts from their involvement in and association with ASM activities (Hinton et al. 2006). Additional research would allow policy makers and donors to effectively implement strategies to assist women.

Gender sensitive access to microcredit

Illiteracy and organisational, financial and technical constraints are often provided as the reasons that women are not benefiting as much as they should be from ASM. A valuable example for programs which build capacity in these areas and which provides a blue print for other initiatives is WORTH (women's empowerment program), an international initiative by the large NGO Pact, which provides literacy skills, financial management training, and start-up support for small businesses. Through WORTH, groups of women come together to create savings funds based on a small weekly contribution, which can serve as loan capital and can assist in accessing micro-credit. Hayes and Perks (2011) outline how the program was used in the Democratic Republic of the Congo (DRC) where ASM supports 16 to 20% of the population and women constitute 50% of the workforce and are often the sole household providers, which is not uncommon in post-conflict situations. Although in this context the program ultimately aimed to encourage women to find employment outside of ASM, it provides a good blueprint for women seeking to work more effectively in ASM. A key feature in the success of the WORTH project is the emphasis on building social capital through teaching literacy and numeracy skills. In the



example from the DRC, the WORTH program also gave women confidence and skills to address sexual violence issues rife on ASM fields in DRC (Hayes & Perks 2011).

Alternative livelihoods approaches/Livelihood diversification

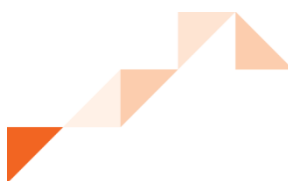
A number of factors, including a reduced market value for agricultural commodities, increased emphasis on cash crops, and reductions in subsidies on inputs such as fertilizers, have led to smallholder agricultural production becoming unviable in much of Sub-Saharan Africa (Banchirigah & Hilson 2010). This has led to a number of farmers entering ASM to supplement their incomes. At the same time, however, many policy interventions to discourage illegal ASM have focused on alternative livelihood projects, which according to Hilson and Banchirigah (2009), have mainly been agrarian-based, rooted in the legacy of Africa's Poverty Reduction Strategy Papers, which had a small-farm focus. Large-scale mining projects also commonly invest in alternative livelihood programmes in an attempt to curb illegal mining on or near their concessions (Aryee et al. 2003). However, Banchirigah and Hilson (2010) state,

“[t]he belief that individuals will pursue these activities, many of which were abandoned in favour of ASM in the first place, suggests that policymakers place little value on the prevailing pattern of de-agrarianization unfolding in sub-Saharan Africa” (Banchirigah & Hilson 2010).

Similarly, Marcello Veiga, a technical advisor with the Global Mercury Project suggests that, “Mining *is* the alternative livelihood.” (Siegel & Veiga 2010 as cited in Sippl & Selin 2012. p.27).

As an example, Hilson and Banchirigah (2009) criticise the approach being taken in Ghana to implement alternative livelihood projects in mining communities. They suggest that the economic activities promoted by these projects have been unpopular with target groups reflecting, “how little in tune the organisations championing [alternative livelihood] activities are with the mindsets and ambitions of rural populations” (Hilson & Banchirigah 2009). Banchirigah (2008) describes a case study in Noyem, Ghana, which revealed that many of the women, children and elderly who engaged in ASM would take up alternative jobs if they were available. However, the author points out that it is unrealistic to assume that every individual will abandon ASM if there are alternative opportunities in the agricultural sector. There are a number of reasons miners may not be willing or able to move away from ASM:

- They may have invested heavily in operations and be indebted to buyers. Mining may be the only way these operators can eliminate debt (Banchirigah 2008).
- ASM offers a range of employment in different fields – unlike monotonous farming jobs often promoted by alternative livelihoods programmes (Banchirigah 2008).

- 
- In some countries/regions, ASM is strongly linked to influential traditional leaders if these leaders condone mining activities.

Hilson and Banchirigah (2009) question the extent to which alternative livelihood projects are actually slowing the growth of informal mining. They make some key suggestions as to how alternative livelihood programs could be improved, including the following:

- Alternative livelihood programs should be developed in parallel with activities aimed at formalising ASM.
- Alternative livelihood programs should be aimed at preventing people from pursuing employment in ASM as well as attracting those already engaged in ASM.
- It should be recognised that a wide range of individuals are employed in ASM – including those who have completed high school, have technical training and/or hold university degrees –not all of whom will be interested in agrarian-based alternative livelihoods.

Aryee et al. (2003) discuss a number of alternative livelihood projects being undertaken by mining companies in Ghana, including AGC (Bibiiani), Resolute Amansie, Abosso Goldfields, Bogoso Gold, and Satellite Goldfields, that focus on providing skills and/or entrepreneurship training programs. For example, some of these programs offer training in small-business management, modern farming techniques for food and cash crops, and livestock farming. Banchirigah (2008) discusses AngloGold Ashanti's programs in Ghana, which have attempted to develop income-earning activities such as vegetable farming, snail cultivation and grass-cutter rearing. While these projects have been praised by the Ghana Chamber of Mines and several donor agencies and multilateral organisations, Hilson and Banchirigah (2009) criticise how particular alternative livelihoods projects are chosen and by whom, suggesting that this might too often follow the agenda of mining companies or policymakers and company officials with their "own ideas" (Hilson & Banchirigah 2009, p. 182). They discuss how a World Bank-funded study undertaken by the Minerals Commission found that many youths in selected areas were more interested in skills such as masonry and carpentry than in agrarian-based activities (Hilson & Banchirigah 2009). Despite these findings, the government elected to implement an oil palm agricultural project in the ASM locality of Prestea. They suggest that many of the assumptions made by major mining companies and the Ghanaian government surrounding alternative livelihoods projects are not correct, including the fact that the alternatives are necessarily more attractive than ASM, that individuals are willing to take up the activities on offer, and that the programs being implemented will be wide reaching enough to alleviate poverty.

Section Two: Work Plans on Return

Methodology and overview

A total of 34 Work Plans on Return (WPRs) focused on ASM from 18 different countries (Burundi, Cameroon, Central African Republic, Ethiopia, Ghana, Kenya, Liberia, Madagascar, Malawi, Mozambique, Nigeria, Peru, Philippines, Rwanda, Senegal, Sierra Leone, Tanzania and Zambia) were reviewed. Refer to Figure 1 for the number of WPRs reviewed in each of the 18 countries. The majority of participants were from mining ministries in the various countries (23 participants or 68%) followed by universities or technical institutions (5 participants or 14%), other government departments (4 participants or 12%) and NGOs (2 participants or 6%).

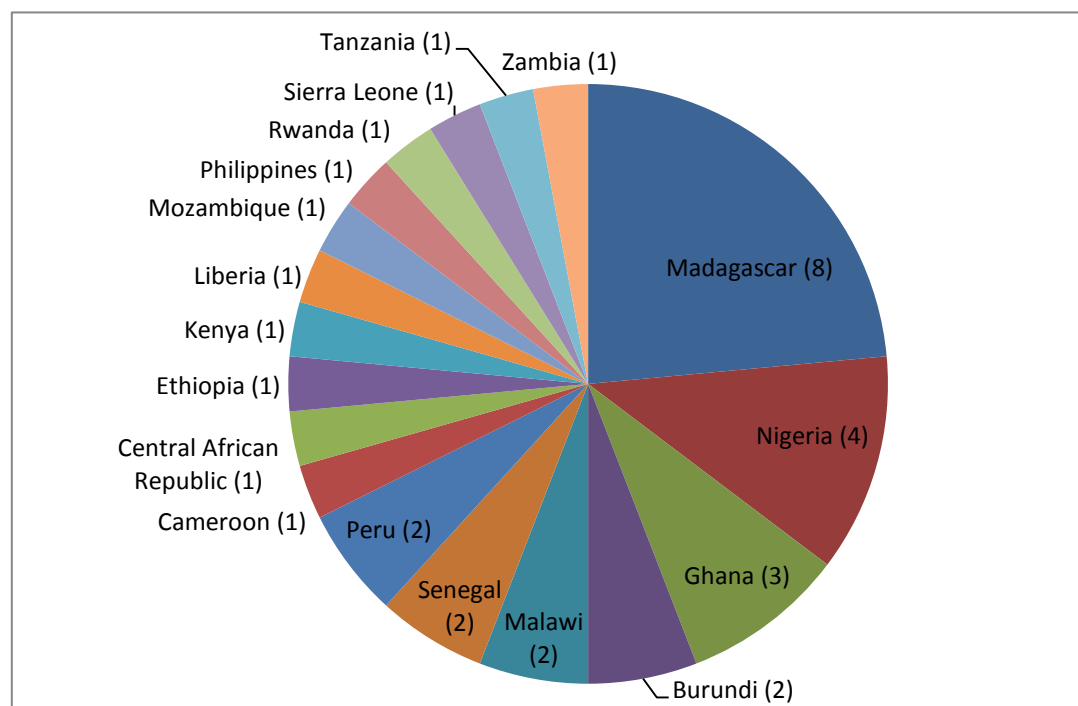
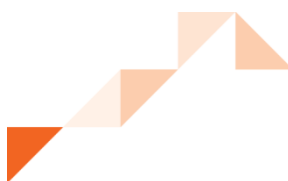


Figure 2: Countries of focus of the 34 WPRs

The WPRs were drawn from the following Australian aid-funded courses, which ran from 2012 – 2014:

- 2012 Short Course in Managing Corporate Community Relations
- 2012 African Women in Mining and Development Study Tour
- 2012/2013 Occupational Health, Safety and Environment Short Course
- 2012/2013 Community Aspects of Resource Developments (CARD) Short Course
- 2014 Environmental Management in Mining



The WPRs (and supplementary information) were obtained through the following means:

- Directly from the participants (via email, file transfer, interviews and/or course presentations);
- Directly from course coordinators involved in the courses; and
- M4DLink (the International Mining for Development Centre's online forum).

Progress data was collected for 20 of these WPRs (from Burundi, Ghana, Ethiopia, Madagascar, Malawi, Mozambique, Nigeria, Rwanda, Peru, Tanzania, and Zambia) via mail, telephone calls and face-to-face interviews with participants. Additional information was obtained from post-course reports written by course coordinators following visits to select countries (Madagascar and Ethiopia) to evaluate these courses as well as participants' progress on their WPRs.

Face-to-face interviews were conducted with 13 individuals in government and universities from 11 developing countries (Burundi, Cameroon, Ethiopia, Ghana, Kenya, Liberia, Malawi, Nigeria, Philippines, Rwanda and Zambia) who are involved with ASM in some capacity and five academics/consultants working in developed countries on initiatives related to improving the governance of ASM in developing countries.⁴ These interviews focused on the key issues facing the ASM sector in developing countries.

Reflecting the 'action research' focus of this project, the interviews were also used as a platform to share knowledge and networking opportunities. In addition, the primary researcher on this project was involved in supporting the development of a number of the WPRs and used knowledge gained of the constraints faced on more advanced projects to advise participants developing their WPRs about the potential issues that could arise and possible ways to address them. The researcher was also involved in the M4DLink forum on ASM and conducted training for the 2014 Environmental Management in Mining course sponsored by IM4DC based on the knowledge gained through this project.

Data (WPRs, progress data, interview transcripts) was analysed using NVivo software, using a simplified grounded theory approach whereby the data was analysed according to categories and topics that emerged from the data itself rather than *a priori* assumptions (Glaser & Strauss 1967).

Figure 3 shows the areas of focus of the 34 WPRs.

⁴ Two of these interviews were via telephone. Some of these interviewees also produced WPRs focused on ASM.

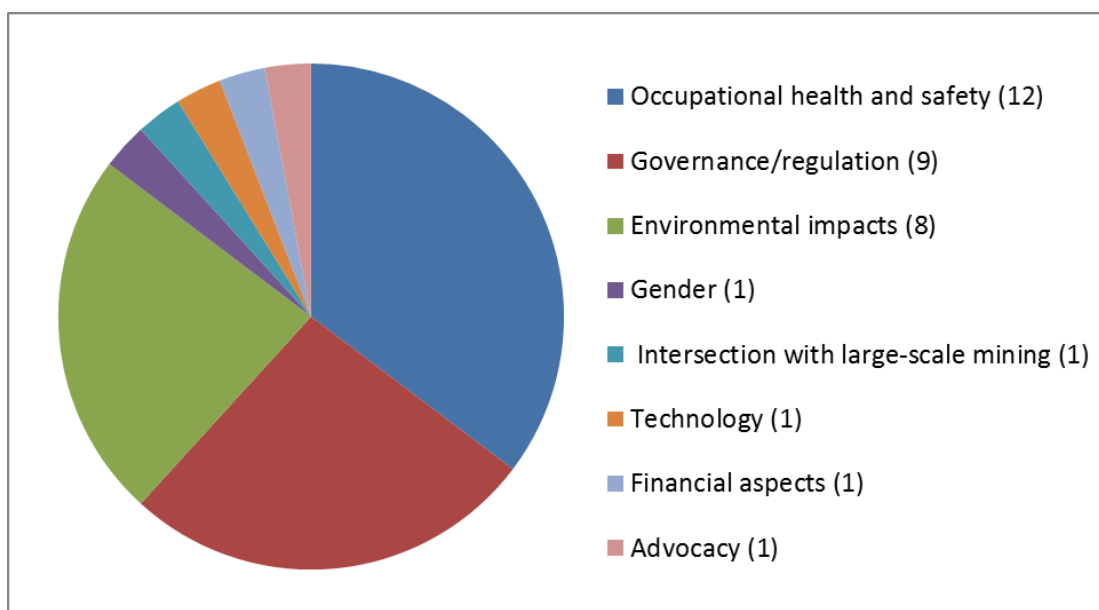


Figure 3: Focus Areas of the 34 WPRs

The focus areas of the WPRs are examined below; however, it should be noted that the themes are cross cutting, and some of the WPRs that focus on governance/regulation or environmental impacts have a dual emphasis on occupational health and safety or vice versa. In an effort to simplify, they have been classified according to their dominant theme.

Of the 34 WPRs, 12 (35%) focused on sensitisation, training or capacity building, with eight of these focused on Occupational Health and Safety (OH&S). Nine WPRs (26% of the total) across the different thematic areas included the development of guidelines, with four in the area of OH&S, two in the area of governance and three in the area of environmental impacts. Four WPRs focused on increasing the capacity of mines inspectors, with three focused on developing manuals/checklists for mine inspectors. Two WPRs have used the formation of cooperatives as a stepping-stone towards achieving broader goals. The majority of the WPRs consisted of programs aimed at artisanal and small-scale miners themselves, rather than internally (e.g. improving government processes). They were mostly practical in nature, with very few having only text-based outputs.

The key barriers to implementing the WPRs as highlighted by their authors are shown in Figure 4 below. The top barriers identified by the WPRs were:

- Funding
- Miners' lack of trust, acceptance or understanding;
- Lack of political will or understanding of ASM on the ground

- Lack of support generally; and
- Resources (other than financial or human).

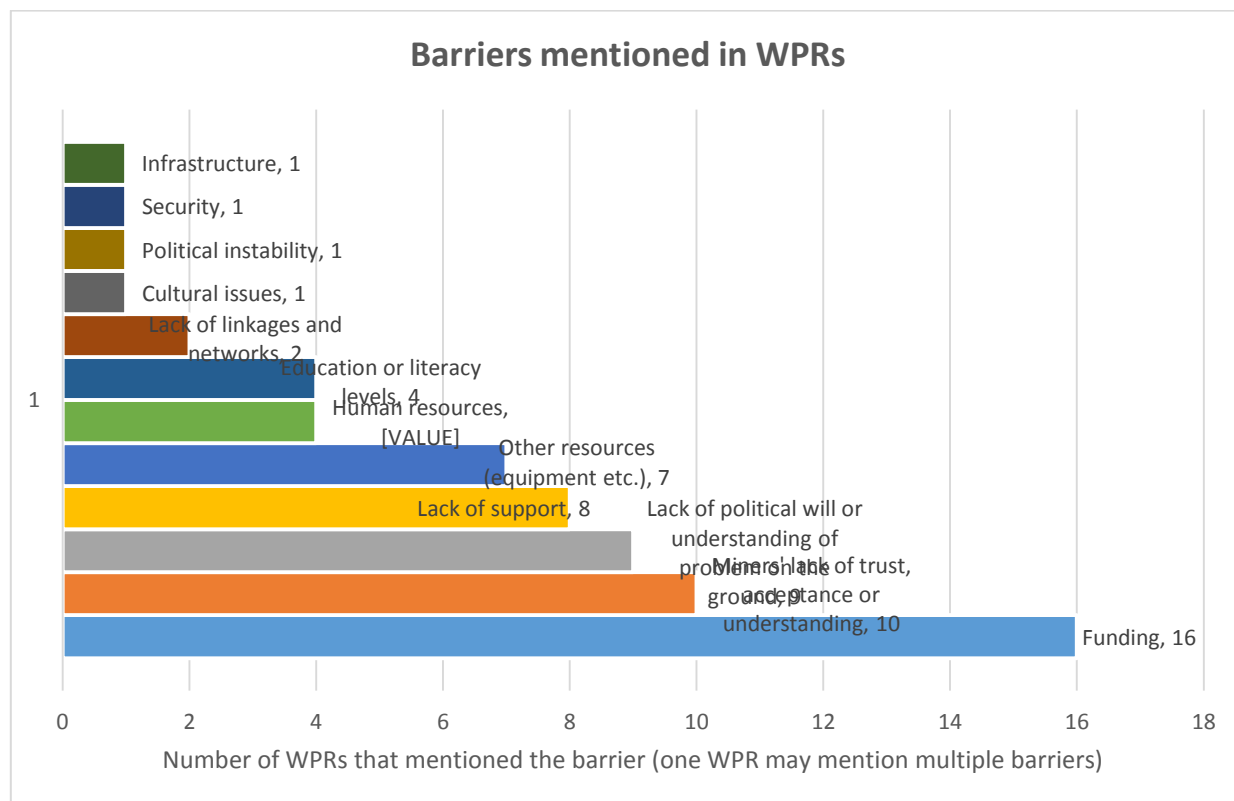



Figure 4: Barriers mentioned in the WPRs

The following section describes each of the WPRs under their areas of focus and discusses their progress where data on progress was obtained. More detailed information about the progress of the WPRs from Madagascar and Ghana is found in [Section 3: Madagascar Work Plans on Return \(WPRs\)](#) and [Section 4: Ghana Work Plans on Return \(WPRs\)](#).

Occupational Health and Safety

12 of the 34 WPRs (35%) reviewed for this study were primarily about occupational health and safety (OH&S), with an additional four WPRs from other areas containing OH&S aspects (meaning that close to 50% of the WPRs were concerned with OH&S issues in ASM). All of the OH&S-focused WPRs had a capacity building focus, with eight aimed at delivering sensitisation or awareness training to miners and four focused on developing guidelines, manuals or checklists. An additional three of the training/sensitisation-focused WPRs also aimed to develop guidelines or informative materials as part of their program, meaning that seven of the 12 (58%) of the OH&S-focused WPRs looked to develop informative materials as part of their project. Two WPRs included a train-the-trainer component into their program.



Four WPRs had a risk assessment focus, reflecting the content of the course in Australia and an attempt on the part of the participants to incorporate this into their work in their home countries. Two WPRs focused on the use of mercury, with both looking to raise the awareness of miners about the impacts of mercury use and promote best practice, one focusing on mercury-free production and the other on developing good practice guidelines and a workplace health and safety management system. One WPR focused on promoting the use of personal protective equipment (PPEs), choosing to do so using graphical/pictorial information, which was one of the few WPRs that recognised the importance of alternative methods of communication in working with artisanal and small-scale miners.


The majority of the WPRs focused on changing the practices of the miners themselves, with only two WPRs focused on improving the work of inspectors, and one focused on amending legislation to include more comprehensive health and safety guidelines. Many of the OH&S-focused WPRs tried to cover the entire range of OH&S issues in ASM, and could potentially have narrowed their focus to be more achievable. The OH&S focused WPRs showed that knowledge building and sensitisation was seen to be a key issue in this area. However, only three of the OH&S-focused WPRs incorporated data collection on the ground to better understand the reasons for limited uptake of OH&S strategies in ASM, with the majority basing their projects on the assumption that lack of knowledge or awareness of the hazards was the key problem to be solved. However, in the interviews, participants held mixed opinions as to whether miners were aware of the hazards and what barriers, such as lack of resources or enduring traditional practices, stood in the way of miners taking safety precautions. One WPR acknowledged the importance of workplace culture in changing practices.

Sensitisation and training initiatives for miners

1. *Sensitization on Occupational Health, Safety, and Environment (OHS&E) in small-scale and artisanal mining in Toamasina (Madagascar).*

This WPR aimed to raise the awareness of artisanal and small-scale miners to OHS&E issues through information provision, education and sensitisation workshops delivered by the Provincial Direction of Mines. To develop the content of the workshops, data on health and environmental issues would be collected to identify priority areas for intervention. The WPR also included the development of informative materials, including brochures and flyers. For information on the progress of this WPR, refer to **Madagascar Work Plans on Return (WPRs)**.

2. *Training for Small Scale and Artisanal mine managers/cooperative heads in Rwanda on Health, Safety and Environmental Management in mining.*



The first phase of this WPR aimed to train mine managers, cooperative heads and local environmental authorities on a broad range of issues, including mining techniques; risk and hazard assessment and management; health and safety; mineral traceability (reporting and data management); inspection techniques and roles; mining legislation; environmental management and conditions of approval; noise control; and mine security and illegal mining. The inspection section was new to the Rwanda Natural Resources Authority/Geology and Mines Department at the time this WPR was developed, so the project first planned to train five new mining inspectors in early 2013, and then depending on availability of resources, the cooperative heads. The second phase of the WPR aimed to train local authorities in inspection techniques, mining regulations, and the role of local authorities in dealing with ASM and local communities. This WPR also included the development of a manual on mines inspection.

Progress

At the time of data collection, this WPR was more or less on target in terms of its planned outputs, despite having started later than expected due to human resource constraints and logistical issues. Training on OH&S in mining had been successfully conducted for newly recruited inspectors, and training was also in the process of being conducted in four Provinces and Kigali city from March to April 2013. The participants included Vice Mayors in charge of mining; District Environmental Officers; District Security Organ representatives; and two individuals representing mining companies or cooperatives in every district in the country. A training workshop for local mining companies and cooperatives was planned for February 2014, depending on the availability of resources.

The project gained some media exposure in two local newspapers and national TV. The primary challenges were financial and human resource constraints, including finding staff trained in mining to conduct the training. Rwanda has a lack of mining engineers, due to a lack of institutions teaching mining-specific courses. The current mining inspectors have educational backgrounds in environmental science, geography, soil sciences and Geographic Information Systems (GIS). There are no mining engineers employed in the department. In addition, as yet, there are no specific OH&S and inspection guidelines at the inspection section, as it has only just been established.

In addition, the low level of formal education of artisanal miners has made it difficult for them to understand the concepts presented in the training and to incorporate them into their day-to-day practices. When asked about any advice he/she would give to someone developing a similar WPR in the future, this participant suggested that consultation and identifying gaps or issues that would be encountered in the plan's implementation and planning how these issues would be dealt with (i.e. mitigation strategies for any possible barriers) was important.

Positive aspects of the WPR included the following:

- 
- Both government officials and miners are willing to cooperate and contribute to the project.
 - There is improved and stronger cooperation and collaboration between miners and local authorities.
 - The decentralised system in Rwanda has facilitated communication.
 - Contacts were made in local government (Provinces, Districts and Security organs) through ongoing mine inspections and the workshops.
 - Partnerships have been formed with other institutions including the Rwandan Police, Rwanda Environmental management Authority (REMA), International Conference for Great Lakes Region secretariat (ICGRL), and the German Federal Institute for Geosciences and Natural Resources (BGR) office in Rwanda.
 - Information sharing with other participants from the course in Australia has assisted with the challenges in implementing the WPR.

3. *Sensitization of stakeholders on the consequences resulting from the mercury in the gold mining activities and training programme for mineworkers based on guidelines prepared on the health and safety management system in their workplace (Cameroon).*

This WPR aimed to sensitize stakeholders on the health and environmental consequences of the use of mercury in gold mining activities through a train-the-trainer program with mine workers and a set of good practice guidelines for the reduction of mercury impacts and tools for a workplace health and safety management system. The WPR would be implemented in partnership with three ASM cooperatives.

The longer-term aim of this WPR was to reduce the level of mercury in ASM wastewater, which would improve economic outcomes in the targeted area (Bétaré-Oya) by reducing the negative impacts of mercury on other economic activities, such as fishing, agriculture and hunting, and ultimately improve the working conditions and lives of mineworkers and residents.

4. *Job Hazard Analysis for Small-Scale Miners (Malawi)*

This WPR aimed to train small-scale miners in occupational health and safety and Job Hazard Analysis (JHA). JHA is a proactive safety management tool through which the risks or hazards of a specific job in the workplace are identified. The specific job is broken down into steps, and each step is looked at to identify the risks or hazards and measures to eliminate or control these hazards are determined and implemented. Developing a JHA for small-scale mining can therefore have a positive impact in helping to reduce the risk of injuries and better still eliminate fatalities. By training small-scale miners in OH&S with an emphasis on JHA, this WPR aimed to eliminate or reduce incidences of injuries and fatalities in small-scale mining and improve working conditions for small-scale miners.



Progress

At the time of data collection, approximately three months after the finalisation of the program, limited progress had been made on this WPR due to a lack of financial support and also because the participant ended up attending an additional month-long training course in Australia just two months after attending the course for which this WPR was developed. The participant did achieve the outputs of writing a report about the OH&S course in Australia and presenting the WPR to management (in December 2013 as planned). In January 2014, the participant had planned travel to the mine site where he/she would develop the pilot project to collect data on injuries and/or fatalities and also to get a picture of the individual tasks involved in mining in order to develop the JHA. Due to financial constraints, he/she was not able to travel to the mine site but made contact with the mine overseer to gather data on injuries and/or fatalities data (January-March, 2014). The overseer showed interest and welcomed the idea to have the pilot project at the mine site.


According to the participant, funding for the project remains the biggest challenge to the project's completion and success. Initially the participant suggested that the project be included in the department's monthly budget as a strategy to overcome this barrier, but now funding for most government departments has been cut due to upcoming general elections in May 2014. The Director of Mines suggested that the project be funded by the United Nations Development Program (UNDP), which has shown interest to fund and work with small-scale miners, youth and women in the country.

Through attempting to implement the steps of the WPR, the participant has realised that data collection on injuries and/or fatalities at ASM sites is not recorded, meaning that decisions for OH&S programs are not based on concrete data. As such, the participant is planning to suggest to management of the pilot mine site that injuries and/or fatalities be included in reports from small-scale miners. This would help in having tangible background data on injuries and/or fatalities and help future decision making with regard to health and safety in this mining subsector. The participant also plans to administer questionnaires to employees of the pilot mine site to get a clear picture of different health and safety problems they face in addition to injuries and/or fatalities.

5. Education and awareness campaign on the health and safety of three small-scale mining operators in Kaduna State (Nigeria).

The aim of this WPR was to minimize, eliminate, substitute or control OH&S hazards in the work environment of small-scale miners through a training and awareness building program with ASM operators. The WPR also aims to provide training on the importance of health and safety in mining to personnel at the Ministry of Mines and Steel Development to provide the impetus for stronger OH&S legislation and regulations in Nigeria.

6. The management and storage of chemicals used by artisanal miners (Sierra Leone).



This WPR aimed to increase the awareness of artisanal miners of the environmental and human health hazards associated with the use of chemicals in mining and promote a safety culture amongst miners – including the proper handling, storage and disposal of chemicals – through meetings, workshops, seminars and discussions with the local miners.

The project would deliver seminars involving at least 20 Mines Inspectors and Mines Monitoring Officers monthly within the Ministry for a period of six months. The training participants would subsequently be expected to conduct at least one meeting or training with artisanal miners or communities after attending the seminar.

7. Improving adoption of personal protective equipment through graphical illustrations for ASM in Nassarawa State, Nigeria.

ASM operators throughout Nigeria face many challenges, including lack of training in and information on geology, mining methods, mineral processing methods, business skills to improve mining operations, safety and health practices and environmental management.


The main objective of this WPR was to curtail injuries and common illnesses associated with using crude and un-mechanised methods of mining. It aimed to achieve this by informing and sensitising miners on the need to embrace healthy and safe mining practices by using personal protective equipment (PPE) such as masks, safety goggles and gloves in their operations. Because pictures are an effective learning aid, the WPR would use graphical/pictorial information on the use of PPEs for mining activities. The first phase would introduce the simplest PPE – masks, gloves and safety goggles – and subsequent phases would introduce other PPE. The illustrations would have captions three main Nigerian languages: Yoruba, Igbo and Hausa.

Progress

At the time of data collection in early 2013, this project was ongoing but progress had been slow. This was mainly due to financial constraints.

8. Analysis on the effect of using mercury in artisanal and small-scale gold mining in Tanzania, case study Chunya-Mbeya.

This project focused on assessing the environmental and health impacts associated with the use of mercury in ASM gold mining in the Chunya district of the Mbeya region of Tanzania using risk assessment methodologies. It also aimed to investigate options for mercury-free production and promote best measures to reduce levels of mercury and address the issues identified. The findings would be disseminated through training, workshops and seminars. While this WPR focused on risk assessment, the awareness-raising component aimed to increase the knowledge and awareness of artisanal and small-scale gold miners about the environmental and health impacts associated with



current practices using a train-the-trainer approach in partnership with the Mbeya Institute of Science and Technology.

Progress

At the time of data collection in March 2013, this project was nearing completion, despite lack of funding and human resources having delayed its progress. The knowledge and skills gained from the course in Australia provided the participant with the opportunity to deliver training at several mining companies in Tanzania.

Checklist/manual for inspectorates

- 1. Improving the level of compliance with mining safety regulations in one small-scale mining operation and one artisanal gold mining site in Kenya through enhanced mining inspections using inspection checklists.***


The level of compliance with mining safety regulations in ASM in Kenya is low, resulting in mine accidents leading to death, serious injuries, loss of livelihoods and health-related expenditures for communities. This WPR aimed to reduce mining accidents and incidents by enhancing mining inspections in both the formal and informal mining sectors in Kenya to improve the level of compliance with mining safety regulations. It would do this by developing two standard inspection checklists for the mining inspectorate, one for a small-scale mining operation and one for an artisanal mining site. Initial inspections would determine baseline safety parameters for the two sites and contribute to the development of the checklists. Subsequent inspections would pilot the checklists, which would be applied across the mining sector in Kenya after successful completion of the project.

- 2. Implementation of a manual for OHS&E inspection for the mining activities in Madagascar.***

This WPR aimed to reduce the number of accidents and improve personal health in mining activities in Madagascar by developing an OHS&E manual for the inspection department at the Ministry of Mines. The manual would contain a series of essential inspection parameters for mining and environmental inspections of both small-scale and large-scale mines. It would be piloted in the field and refined based on the findings. For information on the progress of this WPR, refer to **Madagascar Work Plans on Return (WPRs)**.

Guidelines for miners

- 1. Preparation of guidelines for occupational health, safety & environment (OHS&E) for Artisanal and Small-Scale Gold Mining in Madagascar.***



This WPR aimed to develop and implement OHS&E guidelines to assist artisanal and small-scale gold miners to implement OHS&E management successfully in their activities. For information on the progress of this WPR, refer to [Madagascar Work Plans on Return \(WPRs\)](#).

2. Guidelines for artisanal/small-scale mining OHS&E in Burundi.

While ASM activities in Burundi offer opportunities for many people to reduce their levels of poverty, the methods used to extract minerals (notably in artisanal mining) cause negative sanitary, safety and environmental impacts, as well as fatal accidents. The aim of this WPR was to provide guidelines to help ASM operators to prepare and implement management systems on OHS&E as a proactive strategy for addressing the OHS&E issues arising from mine operations. The guidelines would focus on inspection (OHS&E assessment), prevention and remediation of mine hazards, mine damages repair, and mine conversion when required.

Progress

Progress data for this WPR was collected in early 2013, at which time only some phases of the WPR had been successfully implemented (Bofinger 2013):


- Reviewing existing international legislation on occupational health, safety and environment (OHS&E);
- Preparing an outline for the guidelines to build support for the project and make sure no key areas have been omitted;
- ASM fieldtrips and selection of pilot mining sites (although these have not yet been approved);

Other aspects of the WPR had not yet been implemented due to the participant having changed employer and area of work and the new employer not being familiar with the WPR process following courses in Australia and not recognizing the importance of the WPR or prioritizing its implementation. The participant was not able to advise when the project would be completed (Bofinger 2013).

Governance/Regulation

Nine WPRs (26%) focused specifically on the governance or regulation of ASM (that is, developing legislation, regulations, or policies or implementing these). However, the majority of the OH&S-focused WPRs were also indirectly aimed at assisting the implementation of legislation or regulations through the sensitisation of miners and inspectors.

Three of the governance-focused WPRs aimed to amend environmental legislation to include the social aspects of ASM – two focused on incorporating OH&S considerations into the environmental regulations governing ASM and one on incorporating broader



‘social responsibilities.’ Four WPRs were focused on the implementation side of governance/regulation, with two WPRs focused on encouraging miners to formalise their activities through sensitisation programs and two aimed at encouraging miners to form cooperatives to assist the government in regulating their activities. Only two of the governance/regulation-focused WPRs had a research focus.

Amending legislation

1. *Consideration of Occupational Health and Safety (OH&S) in Environmental Texts for the Ministry of Mines in Madagascar.*

While current environmental legislation governing mining in Madagascar discusses the environmental obligations of mining operators, it does not detail their obligations from a health and safety perspective. This WPR aimed to amend existing environmental legislation in Madagascar to include health and safety aspects. It would include the OH&S obligations of miners in order to gain environmental permits and authorisations for mining and would encourage the government to monitor and evaluate mining activities from a health and safety perspective. For information on the progress of this WPR, refer to [Madagascar Work Plans on Return \(WPRs\)](#).

2. *Guidelines for Occupational Health, Safety and Environmental in Extraction of Aragonite and Celestite in Madagascar.*


While deposits of aragonite and celestite in Madagascar are rare, authorisation for mining of these minerals does not currently require an environmental license. This WPR aimed to apply knowledge about OHS&E legislation and regulations gained through the course in Australia to establish guidelines, standards and an OHS&E management system (enshrined in a ‘code of conduct’ and ‘commitment plan’ within existing legislation) for the mining of aragonite and celestite (celestine) in Madagascar. For information on the progress of this WPR, refer to [Madagascar Work Plans on Return \(WPRs\)](#).

3. *Madagascar Small Scale Mining (SSM): Improving the social dimension of the environmental specifications of operators.*

This WPR aimed to review and modify the existing environmental specifications for licensing of small-scale mining operations in order to enhance the social responsibilities of small-scale mining operators. For information on the progress of this WPR, refer to [Madagascar Work Plans on Return \(WPRs\)](#).

Encouraging formalisation through training

1. *Understanding the views and needs of miners and other stakeholders with a view to formulating acceptable programmes that will enhance their compliance to regulations (Nigeria).*



This WPR aimed to develop and deliver an education and awareness-raising program to encourage artisanal and small-scale miners to formalise their activities. The program would attempt to highlight the benefits of obtaining small-scale mining leases and the implications of not operating according to the requirements of the Nigeria Minerals and Mining Act. It incorporated a number of interactive exercises gained through the course in Australia.

The topics and modes of delivery of the program would be developed through a series of interactive focus groups discussing the benefits of formalisation, the challenges of formalisation for miners, and the reasons many miners do not approach the Ministry for information, registration and licences. The focus groups would be comprised of: 1) representatives of performing and registered mining cooperatives; 2) representatives of miners who have not registered and have not obtained small-scale mining leases; and 3) government officials.

The focus groups would also gather information about the best communication tools to support the development and delivery of education and awareness raising appropriate to difference audiences. For example, content in the awareness-raising workshops might be delivered in a diagrammatic format (e.g. maps, flowcharts, pictures) rather than text-based formats to ensure that a wider audience can understand and participate in the discussion around licensing.

The WPR included an iterative monitoring and evaluation process whereby evaluation from the first focus group would be incorporated into subsequent focus groups and the process, if successful, would be replicated in other regions. Information gained through the evaluation process would also be analysed and used by the Department for policy formulation.


2. Guidelines for regulation of small-scale gold mining in Northern Madagascar

This WPR aimed to assist in regulating gold rushes in Northern Madagascar by developing guidelines for miners outlining the key legislation and regulations for in ASM in Madagascar. The guidelines (to be published in both French and Malagasy) would be followed up with training and sensitisation with mining communities and local authorities to encourage legal mining practices. For information on the progress of this WPR, refer to [**Madagascar Work Plans on Return \(WPRs\)**](#).

Formation of cooperatives

1. Improvement of mining activities by consolidation of artisanal mining associations in cooperatives (Burundi).

The ASM sector in Burundi is disorganised and uncontrolled with little revenue returning to the government through taxes. Artisanal miners undertake open-pit mining and use



mercury and cyanide to process gold, which has numerous health, safety and environmental impacts. This WPR aimed to increase the profitability and sustainability of ASM in Burundi by:

- Developing an integrated management plan for artisanal mining;
- Encouraging the formalisation and organisation of the ASM sector;
- Devising realistic implementation plans to enhance institutional capacity to regulate ASM and provide support services;
- Improving the livelihoods of miners by encouraging more profitable mineral extraction, processing techniques, and business practices through technical services field trips;
- Encouraging miners to use mining revenues to contribute to the sustainable development of surrounding communities;
- Reducing the socio-environmental impacts of mineral extraction through technical supervision of mining associations or cooperatives;
- Reducing human rights violations in ASM, including child labour;
- Raising local capacity to run tracking and certification schemes and enforcing bans on the transportation of non-compliant minerals; and
- Involving all stakeholders (government, civil society organisations, companies, and local communities) in decision-making.

2. Organising ASM into Cooperatives/Enterprise Group Mining in Liberia.

The Ministry of Lands, Mines and Energy (MLME) in Liberia through its Department of Mines, Mineral Resources and Conservation has found it difficult to curb illegal ASM activity in the country and to monitor and minimise the environmental and social impacts, including health and safety hazards and conflicts over land associated with ASM activity. There are no environmental guidelines for regulating ASM activity.

This WPR aims to formulate environmental guidelines for artisanal and small-scale miners and ensure compliance with these guidelines to reduce the environmental impacts of ASM activities. The environmental guidelines would include a code of environmental responsibilities for artisanal and small-scale miners, which would include obligations to rehabilitate environments that they have mined. In order to this, the WPR will encourage artisanal and small-scale miners to form cooperatives or group mining enterprises to assist the government in monitoring their activities. It will use a range of incentives to encourage miners to form cooperatives, including financial assistance in the form of grants or loans, technology transfer to enhance productivity, training, and capacity building.



Policy research

1. *Report on how small-scale mining is being addressed by public policies and responses of artisanal miners (Peru).*

The aim of this WPR was to understand the concerns of policy makers and artisanal miners to produce a set of conclusions and recommendations to assist the two parties to address their concerns. Comparative discussion workshops with artisanal mining representatives and government representatives (environment and mining ministries) would be conducted, focusing on the principle concerns of both groups. The information gathered through the workshops would be supplemented with case studies of at least three ASM zones, and the conclusions and recommendations would be presented to policy makers and artisanal miners.

2. *Comparative desk study on ASM legal framework between Peru and Ghana (Peru).*


ASM has become an important topic on the public agenda in Peru. The government has recently implemented offices in mining locations to assist miners with formalizing their operations, but has faced resistance from the miners for a number of reasons. This WPR aimed to compare legal frameworks for ASM in Ghana and Peru through a comparative desktop study. It would consist of a review of legislation, newspaper articles, and previous studies and result in a research paper. The participant developed the plan after hearing her fellow colleagues on the CARD course in Australia discuss how Ghana's Government is attempting to formalize artisanal mining and the problems they are facing in developing a successful legal framework.

Progress

When progress data was obtained for this WPR at the end of 2013, the participant had contacted a journalist studying ASM in the Peruvian region of Madre de Dios to assist in the research. A paper was proposed for April 2014. However, further progress on this WPR was obtained mid-2014, and the desktop study had not yet been completed. The participant was in the process of relocating overseas for his/her studies, and so the project was simplified to an article that would explain changes in legislation and barriers to formalization of ASM in Peru.

Environmental impacts

Eight WPRs (24%) focused mainly on environmental impacts, but a further six of the OH&S-focused WPRs and four of the governance/regulation-focused WPRs also looked to address the environmental impacts of ASM.



Three of the WPRs which focused on environmental impacts looked to develop guidelines: two focused on promoting good practice in environmental management among miners and included training components; and one focused on environmental risk assessment aimed at building the capacity of inspectors. Along with the WPR focused on building the capacity of inspectors, two other WPRs aimed to improve the monitoring of environmental impacts caused by ASM, but both had a multi-stakeholder focus that targeted not just government officials but also miners themselves. Two WPRs had a research focus with one looking at improving the rehabilitation of small-scale mines and the other looking to undertake a geochemical assessment of both active and abandoned mines. Including these two, there were three WPRs in the environmental impacts category that included rehabilitation of ASM mines. One WPR focused on alternative livelihoods as way of protecting a World Heritage-nominated site.

Guidelines

1. *Setting Guidelines for Environmental health risk assessment of large and small scale Mining (Ethiopia).*


The aim of this WPR was to contribute to sustainable development of the mining sector and minimise and mitigate the environmental impacts of mining by developing a systematic environmental risk management framework and standardised guidelines of environmental health risk assessment for both small-scale and large-scale mining. This framework would be based on risks identified through fieldwork and would enhance the capacity of mining inspectors.

Proposed activities included:

- Presentation of the proposed project plan to the Ministry of Mines staff.
- Review existing national literature on environmental impact assessment of mining.
- Review international literature on environmental health risk assessment and management.
- Fieldwork to take samples (water, soil etc.) from selected existing small-scale and large- scale mines.
- Workshop with stakeholders and staff of the Ministry of Mines.
- Report on project.

Progress

After the participant returned to Ethiopia, the title of the guideline broadened from being about 'environmental health' to 'environmental and social impacts'. The WPR would now provide a standardised process for the development and assessment of the impacts of mining, better reflecting the WPR's original aim.



At the time progress data was gathered for this WPR in March 2013, the WPR had been approved by the Minister and the draft guidelines were completed and presented to the participant's supervisor. The next step was to present the draft guidelines to the Minister. A workshop with key stakeholders, including university staff, large-scale mining companies, and directorates within the Ministry of Mines was planned but budgetary and time constraints prevented it from being organised.

There was good overlap between the participant's routine work and the WPR, which assisted in its progress. As the result of the course in Australia, the participant was given additional responsibilities at the Ministry of Mines in the area of ASM and gender. In addition, as a result of a recommendation by the two Ministry personnel who took part in the course in Australia, a new section specifically considering OH&S issues was implemented at the Ministry and three personnel were appointed to the section.

2. Environmental Management Awareness in Artisanal and Small-scale mining (Malawi)

This WPR aimed to assist artisanal and small-scale miners in gaining knowledge on environmental management issues and promoting good ASM practices. It would do this by developing environmental management guidelines on ASM in the local language of miners and providing training and sensitisation to miners on the guidelines. The effectiveness of the guidelines and training would be monitored through inspections and the guidelines altered accordingly with follow-up training and sensitisation provided where necessary.

3. Proposal and popularization of a guide on the best environmental and social practices for artisanal mining (Senegal).

Artisanal gold mining takes place mainly in the Eastern regions of Senegal where it plays a vital role in local economies. However, the living conditions of miners are generally precarious due to their spontaneous settlement of gold sites. Social problems on these sites include, but are not limited to, a lack of social facilities such as potable water, environmental degradation (deforestation, pollution of air and water, etc.) and health problems, including poor sanitation.

The aim of this WPR was to develop a guide of good environmental and social practices to be adopted by miners to reduce the environmental and social impacts from artisanal mining and improve the relationship between miners and local communities. After the guide is developed, meetings would be held with different stakeholders, including miners and their families, local communities, local authorities and the government via the regional committee of environmental monitoring to demonstrate the guide.



Capacity building

1. *Environmental Management in Mining: An information, education, and communication campaign and capacity training-workshop for the small-scale miners cooperative and local government officials in Davao Oriental and Compostela Valley Province, Region XI, Mindanao, Philippines.*


The aims of this WPR were:

- To pass on the learnings gained through the course in Australia to colleagues at the Mines and Geosciences Bureau, including enhancing their capacity to:
 - conduct detailed inspections and monitoring and write detailed technical reports on the subject monitored; and
 - identify key environmental risk factors and impacts that may occur on mine sites and in mining localities and make recommendations on how to mitigate them.
- To capacitate small-scale mining cooperatives and local government units about mining and its impacts and benefits.
 - Cooperative leaders and local government officials would gain knowledge about the economic benefits of mining and be able to identify key risk factors and impacts (environmental, social and cultural) in their provinces and localities and explain how they can contribute to mitigating them.
- To establish a mine rehabilitation reserve fund for small-scale mining operators as a way of ensuring the rehabilitation of areas affected by small-scale mining.
- To prepare a draft manual on environmental management best operations.
- To assist the Provincial Mining Regulatory Board in upgrading the regulatory framework in line with the new policies on mining.

The learnings of the course would be passed on via lectures, seminars and/or workshops covering environmental management in mining, risk assessment, mine closure planning and rehabilitation. A brief report on the outcomes of the lectures, seminars and/or workshops would be developed after completion of the activities, and would include written and photo documentation. The results of the lectures, seminars and/or workshops would be published on the Mine and Geosciences Bureau website, local government unit websites and in other publications. The WPR also planned to disseminate its results via M4D Link.

Monitoring

1. *System for monitoring environmental activities considering social responsibility (Madagascar).*



This WPR aimed to promote community development through the mining sector and a sense of social responsibility among entities by establishing a pilot a system for monitoring activities related to the environmental and social aspects of both large-scale and small-scale mining. For information on the progress of this WPR, refer to [Madagascar Work Plans on Return \(WPRs\)](#).

Research

1. *Geochemical assessment of abandoned and active mine sites and the impacts on the health of mine workers in southwest Nigeria*

Southwest Nigeria has high occurrences of minerals such as gold, aquamarine, tantalite and other precious metals. While the negative impacts of ASM activities on the environment are well known, there is a lack of data to quantify the specific impacts on the environment and the health of miners. This WPR aimed to address this gap through geochemical assessment of abandoned and active mine sites in Southwest Nigeria to assess the type and level of pollution caused by ASM and the implications for the health of miners.

Activities in the WPR included:

- Geological mapping of mining sites.
- Assessment of the current state of environmental degradation resulting from mining activities.
- Identification of contaminated areas within the study area and the type of contamination through geochemical analysis of groundwater, surface water, stream sediments, soil and plants.
- Indication of elevated concentrations of potentially harmful elements.
- Geochemical analysis of blood samples of mine workers, especially women and children, to determine the impacts of mining activities on their health.
- Presentation of the results to stakeholders at conferences, seminars and workshops.
- Education program for mining communities and government on the risks of mining activities based on generated data.
- Publication of the results in reputable international and local journals.

The project was expected to run for one to three years depending on funding and included a progress report to be completed every three months. The WPR also identified funding strategies.



2. Participatory evaluation of mine rehabilitation challenges in Ghana

The aim of this WPR was to identify challenges facing post-mining landscape efforts for both industrial and artisanal gold mining companies in Southwest Ghana through participatory assessment and evaluation of current rehabilitation plans. For information on the progress of this WPR, refer to **Ghana Work Plans on Return (WPRs)**.

Alternative livelihoods

1. An attempt toward the control and legalisation of artisanal mining within the Mwela Rock Art National Monument area for Sustainable Community Development (Zambia).

The Mwela Rock Art paintings are located 5km from Kasama along the Mungwi-Isoka Road in the Northern Province of Zambia. They were first recorded in 1957 and were declared a National Monument in 1964. The site has potential to be nominated as a World Heritage site; however, clay soil mining for brick making, black soil mining for agriculture, and construction stone mining for crushing/quarrying undertaken by local communities are threatening to destroy the rock art.

The aims of this WPR are:

- to effectively stop illegal artisanal mining in the Mwela Rock Art Protected Area;
- to strike a balance between conservation of the heritage resources and the exploitation of artisanal mining products in the area; and
- to coin alternative livelihoods for illegal artisanal miners

The project would involve the formation and mobilisation of a Community Conservation Committee to select sites for legalized artisanal mining. The criterion for this selection would be based on “safe areas” where mining can continue without endangering the ancient rock and the impending nomination of the site as a World Heritage site. The project would also involve capacity building, with the help of UNESCO, to develop alternative livelihoods for the illegal miners around the site. The project hoped to change attitudes of local people toward conservation efforts and conservation staff and reduce ASM activities in the site by assisting community members to diversify into renewable resource consumption and sustainable agriculture.

Key outputs from this WPR were:

- Utilisation of a new cultural village constructed at the site through selling of handicrafts and cultural performances.
- Fewer people involved in quarrying.
- Establishment of an environmental education centre within the national monument site.



Progress

At the time of data collection, this WPR was taking longer than planned but the participant stated that it did not have an official ‘end-date,’ as it was intended to be an ongoing-project; one lesson that the participant emphasised was that the management and conservation of heritage sites and resources should be treated as a “process and not as a project.” The participant believed that solid foundations had been laid for work in the future. The outputs of the project remained the same.

The participant had discussed the WPR with his/her supervisor, officials from the local forestry department and a group from the local community, some of whom were supportive. Key challenges encountered in the implementation of this WPR included:

- Resistance from the local people to participate in conservation efforts;
- Local people demanding ‘financial benefits’ for moving away from quarrying activities or being relocated (asking for unattainable compensation); and
- Lack of funding for conservation activities from the central government.

The positive aspects of this WPR included:

- the participant has been able to engage with and create a network of different stakeholders;
- the knowledge gained on how best to engage with local communities through corporate social responsibility; and
- the knowledge gained on writing proposals that emphasise and take care of local community needs and concerns.

When asked about advice for anyone in the future putting together a similar WPR, the participant advised that they “be very, very patient with local people/artisanal miners.”

Gender

Despite the numerous gender-related issues in ASM, only one WPR had a gender focus. This WPR was one of two WPRs that included an alternative livelihoods component.

1. Developing a network of women working in artisanal mining in Mozambique.

This WPR aimed to develop a network of women working in artisanal mining in Mozambique. Through this network, the project would encourage women to form associations of women miners and would provide capacity building for alternative livelihoods, such as handicrafts and the production of ceramics.



Progress

At the end of 2014, this project had been presented to the Mozambican Ministry of Mineral Resources (MIREM), which had given tentative authorisation for the project but had requested a study to better understand the issues involved.

Intersection with large-scale mining

Only one WPR of the 34 looked at managing the relationship between artisanal and small-scale miners and large-scale mining companies. This WPR was developed by an individual working for a small-scale mining network.

1. *Conflict resolution between the large-scale mining companies and the artisanal miners (Ghana).*

The aims of this WPR were:

- to foster trust and harmonious relationships between large-scale and small-scale artisanal miners through consultative engagement;
- to negotiate with large-scale mining companies to cede part of their concessions to ASM through due process with the regulators; and
- to prepare a simplified handbook for mining license acquisition and mining best practices to enable small-scale miners to understand the license acquisition process and best mining practices.

For information on the progress of this WPR, refer to [Ghana Work Plans on Return \(WPRs\)](#).

Technology

One WPR focused on improving technology in the small-scale mining sector. This project was developed by an individual working for a small-scale mining network.

1. *Upgrading mining technology in the small-scale sector (Ghana).*

This WPR aimed to upgrade technology for ASM by formulating a training program for small-scale miners in conjunction with the University of Mines and Technology (UMaT) in Tarkwa and in consultation with stakeholders. For information on the progress of this WPR, refer to [Ghana Work Plans on Return \(WPRs\)](#).



Financial aspects

One WPR focused on improving the financial literacy of small-scale miners.

1. *Improving financial skills of ASM miners in Central African Republic (CAR).*

Many miners in the CAR do not invest the money they earn from ASM for the future, instead spending their earnings on unhealthy or unsustainable lifestyles. The aim of this WPR was to reduce poverty and improve the livelihoods of artisanal miners by encouraging them to save their earnings and invest in small family businesses. The project would involve working in cooperation with an artisanal mining cooperative and microcredit institution. A pilot workshop would be delivered to the leader of an ASM cooperative in the targeted mining region and would be followed by several other workshops with other miners in the cooperative.

It should be noted that due to violent conflict in the CAR, which has resulted in thousands of deaths and caused the displacement of approximately 500,000 people, this WPR is unlikely to be completed.

Advocacy

Only one WPR had a pure advocacy focus, although some of the research-based and governance-based WPRs were also advocating for legislative/policy changes.

1. *Documentary on Artisanal Mining in West Africa (Senegal).*

This WPR aimed to create a documentary on fair trade gold in Senegal. Limited information was available on this WPR, as the participant had taken leave from their position at the time of data collection.



Section Three: Madagascar

Madagascar is blessed with great mineral wealth with significant deposits of ilmenite, nickel, cobalt, vanadium, coal, bauxite, and iron ore. It is estimated that 450-500,000 miners are involved in ASM in Madagascar, including approximately 150,000 artisanal sapphire miners and 350,000 artisanal gold miners (Cook & Healy 2012). Gold, as well as a wide array of precious and semi-precious stones, ornamental and industrial stones are mined by artisans (Yager 2012). ASM is mainly conducted without a permit; however, the Ministry of Mines is attempting to regulate mining processes, extraction and sales.


The fragile political situation combined with natural disasters such as cyclones, locust infestations and diseases such as the bubonic plague have had disastrous consequences for the Malagasy people. Poverty in Madagascar has risen and is now among the highest in the world. Income per capita reverted to its 2003 level in 2012. The proportion of the population living under the poverty line has increased by 10 percentage points, with the larger effects occurring over 2011–12 as the political crisis deepened. 93% of the population are living on under \$2 a day and 81% on \$1.25, making Madagascar one of the five African countries that have regressed on this MDG indicator (OECD 2013).

Madagascar's Human Development Index (HDI) puts the country in the "low human development" category, ranking 151 out of 187 countries in 2012. There are high levels of illiteracy, low levels of agricultural productivity, and poor infrastructure. The population is young and set to increase rapidly in the next decade meaning that a whole generation will be born into poverty (OECD 2013).

Political context

The fragile political situation in Madagascar has impeded attempts to regulate the mining industry, including ASM. ASM has been severely impacted by unwise political decisions both under the current government and the previous one such as the decision to stop the export of all rough gemstones in 2008 by presidential decree. This led to a loss of livelihoods for thousands of miners, loss of confidence from foreign buyers, and the growth of the black market. The law has been repealed, but only now are rates of production returning to pre-2008 levels (Cook & Healy 2012).

In 2009, in a military-backed coup, Andry Rajoelina proclaimed himself president of a transitional governing entity. This was rejected by most of the international community leading to the flight of a vast amount of foreign aid and tax concessions. The Ministry of Mines has in the past been able to introduce significant reforms to make mining attractive to outside investors facilitated by the World Bank through large reform and governance programs such as *Programme de Gouvernance des Ressources Minérales* (PGRM).



However, in this climate of instability some of the reforms have been challenged as the ruling party seeks to gain political advantage, first by politicising the extractive industry and second by extracting profit to furnish its electoral coffers. The Ministry of Mines, including the Minister, deal with regular challenges to their authority and have all too often been operating almost in a holding pattern as all new permits and changes to mining law have been suspended until after new elections. The Ministry of Mines and its associated agencies, such as the Cadastre and Geological Mapping, have all been challenged by the crisis with a lack of transparency and rampant corruption in some sectors. In January 2014, Hery Rajaonarimampianina, the candidate from Rajoelina's party was elected President. It is hoped he will bring much needed economic stability and confidence back to Madagascar.

Madagascars' mineral wealth

As mentioned earlier, Madagascar has a treasure trove of natural resources. In the past ten years, large industrial scale mining of nickel, cobalt, and mineral sands has begun with the prospect of bringing significant income through royalties and other taxes to the government and regions. However, while ASM is yet to become an important source of revenue for the government, it continues to be a major source/alternative source of livelihood particularly for those living in the countryside. At its peak, it is estimated that ASM has provided employment for up to 500,000 people. Although this number is less than the number of people involved in agriculture, it is five times more than the number of people involved in textiles and manufacturing (Pelon 2010). The growing mining sector reflects the action of fortune seekers, as well as the level of impoverishment and the lack of alternative livelihoods when, for example, agriculture has failed.

Gold

It is estimated that up to 350,000 persons are involved in the artisanal mining of gold. They mostly work in family groups using hand tools and pans, but there are also some cooperatives which are partially mechanized (Pelon 2010). Several tons of gold are produced annually, yet very little in the form of royalties is returned to the state, as the sector remains largely informal and undeclared. All official gold exports have been stopped since 2012, although substantial amounts of Malagasy gold is being sold in Comores and Dubai. Despite the ban on gold exports, it provides an attractive source of income for many.

The activity is unregulated in terms of health and safety, and many children are involved (Cook & Healy 2012). Fortunately to date, most mining is conducted without the use of chemicals such as mercury or cyanide; however, recent reports indicate that Chinese miners have introduced mercury.



Gemstones

Madagascar is world famous for its gemstones. It has semi-precious gemstones including high-grade quartz, tourmaline, beryl, garnet, amethyst, and citrine, as well as precious coloured stones, including emeralds, sapphires and rubies. All mining of these stones is artisanal, and much of the mining takes place informally, with very little in royalties returning to the state. It is estimated that at its peak there were 500,000 involved in gemstone mining providing some of the best quality stones in the world (Cartier 2009).

The sector is unregulated and can be dangerous; underground shafts are made in sandy soils, which can lead to fatal cave-ins, and large plastic bags are used to provide air. Men and youths usually conduct such mining. Women and girls wash, sort, and are involved in buying the smaller stones. Larger stones are in the control of more powerful middlemen who typically sell them to Thai and Sri Lankan buyers for cutting in South Asia or sell directly to the Asian markets through Hong Kong for example.

At present, most cutting and processing of Madagascan gemstones occurs outside Madagascar, and there is neither the expertise nor the equipment to process some of the best blue sapphires in the world. PGRM established the Institute of Gemology with the aim of building capacity in local crafts that would process and cut stones in country. This has been successfully achieved in the opal trade in Ethiopia. The market for such stones is booming in thriving economies of East Asia. It is said that artisanal miners of sapphires receive about 5% of the final value of a fine well cut stone (Cook & Healy 2012). It is currently cheaper to buy stones that have been cut outside of Madagascar than it is to buy locally crafted stones; an opportunity to build capacity and confidence in local people is being missed out on.

Challenges for the Madagascan Government in relation to ASM

Rushes

Over the last 20 years, ASM in Madagascar has been marked by a succession of rushes, sometimes with miners in the tens of thousands converging on specific areas. Many, if not most, ASM rushes have taken place in or very near protected areas and critical ecosystems (Cook & Healy 2012). For the Ministry of Mines and other governing bodies, this presents the critical challenge of how to balance such an important source of livelihood with demands to preserve what remains of one of the world's most bio-diverse places. Another key challenge for government authorities and other key stakeholders and researchers looking to address the problem of rushes is lack of reliable data on gold and gemstone production (Cook & Healy 2012).



Failure to capture revenue from ASM

Because most ASM gold and gemstone mining is conducted informally and is unregulated, very little of the income generated stays in Madagascar either into the state coffers in the form of taxes and royalties or in the form of beneficiation, for example cutting of gemstones and jewellery in-country. If ASM is in fact to contribute to poverty reduction, it is essential for the new government to devise a framework to address these issues.

Lack of reliable data

One of the many challenges facing authorities, such as the Madagascar Ministry of Mines, in their attempts to understand and regulate ASM is the lack of reliable data and information about the sector and a lack of staff.

Clandestine networks operating on the gem fields

Another critical issue highlighted by Duffy (2007) in relation to ASM is the clandestine criminal network that controls the trade in gemstones in the remote mining regions such as Ilakaka. This network exists beyond the rule of law and means that miners may receive far less than they deserve for their stones. Duffy argues that government has withdrawn from ASM in such areas and this does not help promote the livelihood of ASM.

Large-scale mining

The challenges and complexities of dealing in a strategic way with ASM have also been subsumed by the massive growth in large-scale mines, which the Ministry of Mines is ill equipped to deal with. On a visit to the Ministry of Mines in the port city of Tamatave in March 2013, it was observed that staff members in the regional office were trying to understand the international safety standards used in the pressure vessels at the nickel refinery. However, they were too understaffed and too busy with the daily concerns of running a large office in the main port to be able to do this.

The WPRs presented here from government staff deal with specific topical issues related to ASM. What is also needed is long term strategic thinking and planning, which takes into account the challenges mentioned above.



Madagascar Work Plans on Return (WPRs)

Eight Work Plans on Return (WPRs) related to ASM were presented at community relations and occupational health and safety courses in Australia by participants from Madagascar:

1. Consideration of OH&S in environmental texts for the Ministry of Mines in Madagascar
2. Implementation of a manual for OHS&E inspection for the mining activities in Madagascar
3. Preparation of guideline for occupational health, safety & environment (OHS&E) for Artisanal and Small-Scale Gold Mining in Madagascar.
4. Guidelines for occupational health, safety and environment in extraction of aragonite and celestite in Madagascar
5. Guidelines for regulation of small scale gold mining in northern Madagascar
6. System for monitoring environmental activities considering social responsibility (Madagascar)
7. Small scale mining: improving the social dimension in the environmental specifications of operators (Madagascar)
8. Sensitization on OHS&E in small-scale and artisanal mining in Toamasina (Madagascar).

All of these WPRs were developed in mid-2012 through the Occupational Health, Safety and Environment course and Managing Corporate Community Relationships in Mining courses. The primary researcher for this study received direct responses from participants on the progress of five of these WPRs towards the end of 2013, with progress on the remaining three WPRs relying on progress data collected during a post-course visit conducted by Carmel Bofinger and Lynda Lawson in March 2013.

General progress and findings

The course participants from Madagascar have made some progress in implementing the WPRs. Generally, participants found that their colleagues were (eventually) open to engaging on the WPRs, and the Minister of Mining has also been supportive. In most cases, however, progress was hampered by political problems which prevented new mining permits or legislation and innovation in general. The political impasse at every level of Malagasy government has meant that there are no funds for new initiatives and no new legislation can be passed. This is crucial, as two members of the group work in the legal department. There is a shortage of resources within the Ministry of Mines, and most officers have taken on additional duties e.g. extra supervision. This results in insufficient time to allocate to the WPR. The limited working budget is also a problem, and travel to consult with stakeholders is practically impossible (Bofinger 2013). According to Lawson



(2013), several frank meetings with their Minister highlighted the need for support for participants' on-going learning for the new post-election environment (Lawson 2013).

In Madagascar the course participants had the advantage of all being from the same Ministry despite common constraints to the successful completion and implementation of the WPR. In fact, the Minister made a point of identifying the usefulness of integrating a number of projects to move forward in a co-ordinated way to ensure limited repetition of work. As such, at the time of data collection in March 2013, the Malagasy participants were working together to co-ordinate the completion of the WPRs in a sequential manner. The completion of the WPR's directly related to legislation was considered first priority (Bofinger 2013).

Given the constraints under which the public servants work, Bofinger (2003) has emphasised that participants should be encouraged to scope their projects toward realistic outcomes given the timeframe and resources available to them. This is evidenced by the limited implementation of the WPRs in Madagascar. The implementation was not limited by the knowledge or skill of the participants but by work time and budget constraints and further exasperated by the political situation in Madagascar

Bofinger (2013) observed that using the WPR was a good vehicle for post-course visits, as it provided a framework for understanding the impact of the course and the WPR on the workplace. According to Lawson (2013), the structure of the WPR template and the coaching received during the course provided the skills and confidence to participants to write the WPR and revise it where necessary. It also provided a scaffold to participants' learning across various phases and locations of the course.


While the WPR was considered a valuable tool, it was found that the process of developing and implementing WPRs could be improved by more careful involvement of the participant's supervisor at critical key points and by looking for synergy between projects, particularly when participants come from the same team as did the Malagasy group.

Detailed progress report

1. *Consideration of OH&S in environmental texts for the Ministry of Mines in Madagascar*

Overview

While current environmental legislation governing mining in Madagascar discusses the environmental obligations of mining operators, it does not detail their obligations from a health and safety perspective. This WPR aimed to amend existing environmental legislation and regulations in Madagascar to include health and safety aspects. It would include the OH&S obligations of miners in order to gain environmental permits and



authorisations for mining and would encourage the government to monitor and evaluate mining activities from a health and safety perspective.

Progress

In March 2013, the participant had revised existing laws and OH&S information from within the Ministry but had not progressed the WPR further than this. The participant was aiming to continue bibliographic research on existing texts in the Ministry and then to write a draft of what should be included in terms of OH&S. The task would not involve re-writing legislation or regulations but rather would entail including additional information on OH&S.

In January 2014, the participant had completed the draft text, but it was awaiting revision from those responsible for legislation and then approval by the Minister prior to the text being formalised. The participant expected the project to be completed in 2014.

Positive aspects of the WPR

The participant appreciated the exchange of information he/she was able to gain from the interactions with people from a number of different countries in terms of OHS&E in mining. The participant also felt that comparing the situation in Madagascar with Australia was useful – he/she was able to see how mining operators must abide with occupational health and safety standards in Australia due to legislation being well established, while in Madagascar, operators can only follow international standards due to an absence of texts on health and safety. This provided the inspiration for the WPR.


Upon returning to Madagascar, the participant had a briefing with the directors of the Ministry, headed by the Minister herself. At this meeting, the participants of the short-term training in Australia were invited to provide a summary of what they had learned and the WPR they had chosen. This WPR was recognised as useful by the senior officials and the Minister herself, which was very encouraging. The participant found that his/her colleagues were also interested in the project.

Challenges

The WPR was due to be completed in 2013, but the political situation in Madagascar had prevented its completion. Because the project is in draft form, it has been difficult to make it a priority of the Department, particularly as it requires the Minister's approval.

Learning: implications for other projects

Political issues may delay the completion of the WPR, particularly if senior-level approval is required. Any WPR aiming to change or add to existing legislation will take additional time to implement due to bureaucratic processes that need to be followed. Participants



should think realistically about the timeframes for such projects and take into account the political context in their home countries and whether or not this is amenable to their WPR.

2. *Implementation of a manual for OHS&E inspection for the mining activities in Madagascar*

Overview

This WPR aimed to reduce the number of accidents and improve personal health in mining activities Madagascar by developing an OHS&E manual for the inspection department at the Ministry of Mines. The manual would contain a series of essential inspection parameters for mining and environmental inspections of both small-scale and large-scale mines. It would be tested in the field and subsequently refined.

Progress

The name of this WPR changed to ‘Developing procedure for occupational health and safety inspections for the mining activities in Madagascar.’ The procedure would provide the Inspectorate with specific information on the different types of inspections.

The completed activities at the time of progress data collection included:

- Identification of the main risks for activities for small scale mining
- Development of a draft management plan for these risks

Positive aspects of the WPR, challenges and learning implications for other projects


These aspects were not collected for this WPR as data was obtained only from the post-course visits mentioned above.

3. *Preparation of guidelines for occupational health, safety & environment (OHS&E) for Artisanal and Small-Scale Gold Mining in Madagascar.*

Overview

The aim of this WPR was to encourage miners to operate in a modern, safe, and environmentally sound manner and reduce the safety hazards associated with their gold mining activities by implementing an OHS&E Management System. It would do this through the creation of OHS&E guidelines and training for miners in application of the guidelines.

The development of guidelines would include fieldwork in a selected community to conduct a baseline assessment of OHS&E. The draft guidelines would be prepared and



submitted to the Minister of Mines and Gold Sector Manager for approval and adoption by target users. The guidelines would include the following topics:

- Principles
- Risk Management
- Monitoring and inspection
- Injury and illness management
- Incident and Accident reporting and Investigation
- Environmental regulations

Progress

The WPR is currently at the data collection/fieldwork phase. The duration of the project was originally two years, but unexpected events delayed data collection, and the new estimated completion date is the end of 2015.

Positive aspects of the WPR

Through the course in Australia, the participant gained the knowledge, skills and confidence necessary to develop and start to implement the project, and the WPR provided a framework to apply a systematic approach to implementation.

Through the fieldwork to collect data for the WPR, the participant has had the opportunity to build on a database of artisanal and small-scale gold miners in Madagascar for the Ministry. He/she has also formed networks with owners of ASM gold mines, mine employees and local authorities. He/she has also drawn on the contacts made through the course in Australia in the implementation of the WPR.

More broadly, the WPR has assisted in increasing engagement between the Ministry of Mines and artisanal miners. The participant is positive about the potential of this project to contribute in the enhancement of OHS&E among artisanal and small-scale gold miners and has already seen the project spur some changes within pocesses of the Ministry.

Challenges

Data collection in the field presented the main challenge to successful and timely implementation of this WPR. Key issues included the following:

- Access to ASM sites: most of the sites are not accessible by car and require walking many hours.
- Financial: no budget has been designated for the project.
- Time: the participant was assigned to a long-term training project in September 2013, meaning that time has become a critical restraint for the progression of the project in the planned timeframe.



Learning: implications for other projects

Financial and human resources are a key constraint in the implementation of some WPRs. Participants need to carefully consider whether the project will require field data collection. For example, they need to discern if they have to collect baseline information or consult with beneficiary communities and include this in the WPR. Participants also must realistically consider whether the resources (financial and human) for data collection are going to be available. If data collection is required and funding is unlikely to be available, the participant should incorporate activities to generate funding into the WPR, or consider alternative ways of collecting data that does not require the participant going to the field (e.g. collaboration with other organisations already working in the WPR's region of focus).

4. *Guidelines for occupational health, safety and environment in extraction of aragonite and celestite in Madagascar*

Overview

While deposits of aragonite and celestite in Madagascar are rare, authorisation for mining of these minerals does not currently require an environmental license. This WPR aimed to apply knowledge about OHS&E legislation and regulations gained through the course in Australia to establish guidelines, standards and an OHS&E management system (enshrined in a 'code of conduct' and 'commitment plan' within existing legislation) for the mining of aragonite and celestite (celestine) in Madagascar.

This project planned to conduct baseline studies in order to develop the guidelines, which would need to be approved by the Ministry of Mines to be adopted by target users (mining administration, including environmental services, mines inspectors and policy makers, mineral title holders, including mine owners operators and workers, and other stakeholders, including communities). Mining administrators would assist mine operators in the implementation of the guideline.

Progress

A preliminary site visit to Aragonite Andranomandroatra Analavory was undertaken in October 2012. Unfortunately, at the end of 2013, additional progress data had not been collected and the WPR had still not been completed due to political and financial constraints

Positive aspects of the WPR, challenges and implications for other projects

These aspects were not collected for this WPR as data was obtained only from the post-course visits mentioned above.



5. Guidelines for regulation of small scale gold mining in northern Madagascar

Overview

This WPR aimed to assist in regulating gold rushes in northern Madagascar by developing guidelines for miners outlining the key legislation and regulations for ASM in Madagascar. The guidelines (which took the form of a booklet published in both French and Malagasy) would be followed up with training and sensitisation with mining communities and local authorities to encourage legal mining practices.

Progress

This WPR changed upon the participants' return to Madagascar. The original WPR focused on large-scale mining regions in the southwest of Madagascar and building the capacity of the local government to enhance local community development. However, the participant was not able to travel to the southwest of the country due to security concerns. In addition, the participant changed her position in Government to work for a support department at the Ministry that is facing considerable challenges in regulating ASM gold rushes. For this reason, the WPR changed to focus on the management of small-scale gold mining in the northern regions of Madagascar.

A booklet about small-scale mining, gold regulation and mining revenues has been developed and translated into French and Malagasy. The participant currently conducts livelihood training to sensitise small-scale gold miners about how to mine legally and work more profitably to enhance communities' quality of life and development in the region more broadly through small-scale mining. This has led to the creation of a group that works to respond to gold rushes.

Positive aspects of the WPR

Although the WPR changed completely on the participants' return to Madagascar, the structure of the WPR and the coaching and practice he/she had received in writing the original WPR enabled him/her to write the new plan relatively easily. The WPR has provided a useful focus in follow up both with the participant and in conversations between the supervisor and his/her Minister.

Challenges

Time and budget restraints delayed the translation of the booklet into both French and Malagasy, as well as the printing of the document.



Learning: implications for other projects

The WPR is a useful tool to provide the impetus for participants to have conversations with colleagues and supervisors about what they learn in courses in Australia, providing the structure to encourage them to implement these courses.

The importance of tailoring the language of guidance documents to the recipients was highlighted. Miners in particular, may not speak the official language of the country, as is the case in Madagascar.

6. *System for monitoring environmental activities considering social responsibility*

Overview

This WPR aimed to promote community development through the mining sector and a sense of social responsibility among entities by establishing a pilot a system for monitoring activities related to the environmental and social aspects of both large-scale and small-scale mining. It aimed to involve:

- The Ministry of Mines
 - a. Authorization and Environmental Office
 - b. Department of Mines –Mines Branch
 - c. Environmental Office – Regional Direction
- The Ministry of Environment
- The National Office of Environment
- A technical review panel
- Community
- Mining operators

To promote a sense of social responsibility among entities, the key outputs were the following:

- Development of a reflection group to define the responsibilities of each entity in relation to social responsibility.
- A multi-stakeholder workshop.

To establish a monitoring system of environmental activities, they key outputs were:

- Development of a monitoring tool.
- Implementation of a monitoring system.



Progress

The WPR had an end date of April 2013; however, at the time of the course coordinator's post-course visit in March 2013, the WPR was still at the conceptual/planning stage.

Positive aspects of the WPR

The concept of social responsibility in mining and the need for a “social license to operate” was new to the participant. By focusing on this in the WPR (although it is still at a conceptual stage), the participant has brought a critical new insight to his/her workplace. The short course in Australia and development of the WPR have enabled the participant to raise fellow staffs' consciousness about social responsibility – the participant commented that his/her enthusiasm had rubbed off on others in her department, who are now less sceptical. In addition, the participant is now encouraged to attend high-level meetings.

Challenges


Despite the positive aspects above, progress on the WPR has been hampered by some administrative problems and a general lack of support, particularly in terms of materials and financial aspects. Availability of the entities to be involved in the WPR has also been a challenge, as has the political situation in Madagascar.

Learning: implications for other projects

This WPR included more defined methods of evaluation as compared to some other WPRs, including:

- Timecard
- Scorecard
- Minutes
- Evaluation sheet
- Report
- Field trip
- Test Application

This WPR also highlighted that projects that aim to involve a broad range of stakeholders may encounter delays related to the stakeholders' availability and the time involved in coordinating joint meetings and decision-making processes. Participants should take this into account when considering the timeframes and deadlines in the development of their WPRs.



7. Small scale mining: improving the social dimension in the environmental specifications of operators

Overview

Small-scale mining projects in Madagascar do not require an environmental impact assessment (EIA) unless the mine site is located in an environmentally sensitive area. While there are some environmental specifications for small-scale mining in Madagascar, including social provisions, these are not sufficient in the existing model to mitigate the many social impacts small-scale mining, including child labour, lack of worker rights, negative interactions with landowners, limited contribution to community development, and lack of OHS&E safeguards. This WPR aimed to review and modify the existing environmental specifications for small-scale mining operators to strengthen the social aspects in order to enhance the social responsibilities of small-scale mining operators.

The project would:

- engage with small-scale mining operators to understand how they affect and are affected by surrounding communities;
- involve small-scale mining operators in strategies and processes to improve the welfare of the community; and
- develop stronger social specifications to reduce negative impacts and enhance welfare.

Specific proposed activities, to be completed from July 2012 to July 2013, were:

- Conduct desktop research of social specifications.
- Carry out stakeholder mapping and design of engagement process for project stages.
- Perform a critical review of the social aspects of the existing model of environmental specifications of small-scale mining.
- Establish an adapted model in French and in Malagasy and potential strategies to support miners to achieve specifications.
- Disseminate the model to other Inter-Regional Directions of Mines.
- Raise awareness about the need to support interventions among other stakeholders.
- Raise awareness about the social responsibility for small-scale mining among operators.

This WPR included details for all of the activities listed above, including a list of outcomes and itemised budget.



Progress

At the time of data collection in March 2013, this WPR had not progressed as much as anticipated, and implementation had been slow and incremental. However, the participant had established social and environmental specifications in two versions – both Malagasy and French – for one small-scale mining project (the case of aragonite extraction projects in the Itasy region). In addition, the participant had begun to undertake a strategy to support miners to achieve their specifications based on studies conducted in the Ministry 10 years ago. No major modifications had been made to the WPR, but it was expected to take longer than anticipated.

Positive aspects of the WPR

The WPR has provided a valuable focus point for discussion of social aspects of small-scale mining in Madagascar as well as a “systematic road map” from which the participant could work towards introducing social specifications into regulations governing small-scale mining (Lawson 2013).

The course in Australia enhanced the participant’s capacity to negotiation complex issues around the regulation of small-scale mining. For example, he/she witnessed useful models from Ghana that could be applied in Madagascar. The course also gave the participant and his/her colleagues a new focus and assisted them in advocating on behalf of communities.

Challenges

The participant has had many other projects to work on at the Minister’s request. In addition, the participant’s authority to implement change was limited by his/her position in the Ministry.


Learning: implications for other projects

WPRs tend to take longer than expected, often due to human resource or financial constraints and these should be factored into the WPR, for example by including mitigation strategies to deal with inevitable challenges that will arise.

8. Sensitization on OHS&E in small-scale and artisanal mining in Toamasina (Madagascar).

Overview

This WPR aimed to raise the awareness of artisanal and small-scale miners to OHS&E issues, through information provision, education and “sensitisation” workshops delivered by the Provincial Direction of Mines. To develop the content of the workshops, data on health and environmental issues would be collected to identify priority areas for



intervention. The WPR also included the development of informative materials, including brochures and flyers.

Progress

The title of the project had changed to ‘Sensitisation on health and environment issues in artisanal of small scale mining in Toamasina.’ At the time of data collection in March 2013, the following steps for the WPR had been completed:

- The target area has been selected – CR Andranobolaha in Toamasina region.
- The mining operator has been selected based on accessibility to the site.
- Data collection on the site including environmental issues, incidents and injuries was collected (however, no injuries had been reported).
- Priorities were established, i.e. water pollution and conditions of employment (e.g. salary, PPE is not adequate and hot conditions mean that employees sometimes do not use PPE and do not understand its importance)
- Brochures and posters were prepared for the key issues and how to address them.
- The next step at the time of data collection was to distribute the brochures.

Positive aspects of the WPR

The participant had reported having used the knowledge and skills gained through the course in Australia in both office work and field visits. He/she has passed on advice and recommendations to address site-specific OH&S problems. The participant’s line of work also changed after the course in Australia – before he/she concentrated only on environmental aspects of mining, and now the role included OH&S. The participant had made significant progress with the WPR and had good engagement with mining operations in Toamasina.

Challenges

Data was not collected on the challenges faced in the implementation of this WPR.

Learning: implications for other projects

This WPR was a good example of a project that attempted to define its priorities according to data collection and participatory processes rather than pre-define them, which appeared to assist the progress of this project by increasing engagement and buy-in, which provided momentum for the project’s implementation.



Section Four: Ghana

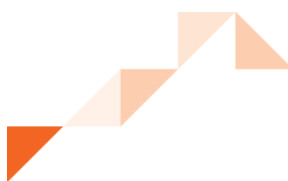
The number of artisanal and small-scale miners in Ghana has increased dramatically over the last 20 years, with some estimates suggesting that 200,000 people were engaged small-scale mining in the 1990s (Appiah 1998; Hilson & Potter 2003), up to 500,000 in the mid-2000s (Tschakert 2009; Nyame & Grant 2014), and over 1,000,000 today (Ghana News Agency 2011; Hilson & Garforth 2013). Estimates vary greatly and the actual number of small-scale miners in Ghana is not known, due to limited data on illegal small-scale miners, which make up the majority (70-80%) of those engaged in the activity (Hilson 2001; Hilson & Yakovleva 2007; Tschakert 2009; Friends of the Nation 2010). The percentage of women involved in ASM in Ghana is said to be around 10% (Amankwah & Anim-Sackey 2003).

Legally, there are two types of small-scale miners in Ghana: those licensed to operate on a demarcated plot of land (legal small-scale miners) who are subject to conditions by the Environmental Protection Agency (EPA) and the Minerals Commission; and those operating without a license (illegal small-scale miners) (Nyame et al. 2009). A distinction is not made between “artisanal” mining and “small-scale” mining in law, as it is in other countries (Aubynn 2009). Illegal small-scale gold mining (and miners) are known as *galamsey*, which literally means ‘gather them and sell’ (Hilson & Garforth 2013, p. 351), although in popular use, many do not differentiate between legal and illegal small-scale mining when they use the term. In addition, the distinction between the two groups are not clear on the ground, and many licensed miners end up mining illegally beyond the land allocated to them, often on the concessions of large-scale mines (Nyame et al. 2009; Friends of the Nation 2010).

Types of small-scale mining

In the 1990s, it was estimated that approximately two-thirds of Ghana’s small-scale miners were engaged in the extraction of gold, with the remaining involved in the extraction of diamonds and only a small number of miners involved in industrial minerals production (e.g. clay, salt, kaolin, cutting stone, and mica) (Hilson 2001; ICMM 2009a). However, following a temporary ban on official exports of Ghanaian diamonds from late-2006 to early-2007, a significant number of small-scale miners have now transitioned from diamond mining to gold mining or a combination of the two (Nyame & Grant 2012). Sand mining and quarrying also appear to be increasing in some regions (Shirimori/ 2006; West Akim District Assembly 2006; Amoah 2012; Ghana News Agency 2012). This section focuses mainly on small-scale gold mining.

The methods used in the small-scale mining of gold in Ghana, can be categorised into three groups (Aryee et al. 2003):


- 
1. Shallow alluvial mining: used to mine shallow alluvial deposits usually found in valleys or low-lying areas. The mineralized material is removed and transported to nearby streams for sluicing to recover the gold. Illegal mining is predominantly this type.
 2. Deep alluvial mining: used to mine deep alluvial deposits found along the banks of major rivers. This method involves excavating a pit and digging until the gold bearing gravel horizon, which is typically located at depths of 7 to 12 metres. Terraces or benches are constructed along the sides of pits to prevent collapse.
 3. Hard rock (lode) mining: adopted to mine gold bearing reefs, which can be located close to the surface or deep-seated. Holes are sunk to intercept the reefs and in cases where ore is hard, explosives are commonly used.

For alluvial ores, the recovery rate of gold is 30-60% (Aryee et al. 2003; Hilson & Pardie 2006). The traditional ore processing method involves sluicing of mined material in a sluice box to obtain gold concentrate, to which mercury is added and mixed to form a gold amalgam, which is then heated to separate the gold (Aryee et al. 2003). In the case of diamonds, a mining method similar to the shallow alluvial mining technique is adopted whereby mined material is transferred on to a jig and washed, and diamonds are picked by hand (Aryee et al. 2003).

In 2012, around a third of the nation's gold production was estimated to come from ASM (both legal and illegal) (Ghana Chamber of Mines 2012), although this fell in 2013 due to the government's clamp down on illegal mining, the falling price of gold, and low recovery from the small-scale miners (Ghana Chamber of Mines 2013).

Political and legislative context (legislation for ASM in Ghana)

Ghana legalised small-scale mining in 1989 through a series of legislation: the Small-Scale Gold Mining Law (PNDC Law 218), Mercury Law (PNDC Law 217) and the Precious Minerals and Marketing Corporation Law ((PNDC Law 219) (Banchirigah 2008; Hilson et al. 2014). Shortly after legalising ASM, the Ghanaian Government also established the Precious Minerals Marketing Corporation (PMMC), which purchases gold and diamonds produced by small-scale miners under the Precious Minerals Marketing Corporation Law (Aryee et al. 2003). The PMMC purchases gold mined both legally and illegally – buying agents employed by the PMMC do not discriminate on the basis of a miner's legal status when purchasing gold (Ghana Chamber of Mines 2012). The PMMC was set up alongside the Minerals Commission, the Mines Department and the Geological Survey Department, as part of the Small-Scale Mining Project (SSMP) funded by monies from the World Bank (Hilson et al. 2007b). In 2006, the legal regime of small-scale mining was integrated into the new Minerals and Mining Act 2006 (Act 703) (Ghana Chamber of Mines 2009).



Small-scale (gold) mining is defined in law as “mining (gold) by any method not involving substantial expenditure by an individual or group of persons not exceeding nine in number or by a co-operative society made up of ten or more persons” and as such includes both ‘artisanal’ (mining using more rudimentary implements) and ‘small-scale mining’ (more sophisticated mining activities operating at a relatively low level of production) (Aryee et al. 2003, pp. 131-2). Legal small-scale miners operate under a license granted by the Minerals Commission on concessions registered in their names (Aryee et al. 2003). Small-scale gold mining licenses may only be granted to Ghanaians (not foreigners) 18 years of age and older, but the law allows Ghanaians holding mineral licenses to enter into agreement with foreign partners to provide, capital, expertise, equipment, etc., for the project (Aryee et al. 2003; Calton Projects n.d.).

Licenses are subject to the following conditions (Aryee et al. 2003):

- a maximum allocation of three acres in the case of a grant to any one person or group of persons not exceeding four in number;
- a maximum allocation of five acres of land in the case of a grant to any group of persons not exceeding nine in number; and
- a maximum allocation of 25 acres in the case of a grant to a co-operative society of 10 or more persons and registered companies.
- Valid for five years for cooperatives (or three years for those other than cooperatives), after which time the license may be renewed.


In addition, small-scale miners of precious minerals (gold and diamonds) are required to obtain an environmental permit from the Environmental Protection Agency (EPA) before receiving a license from the Minerals Commission. The EPA inspects the site prior to issuing the permit, which needs to be renewed every two years and includes the following prerequisites (Aryee et al. 2003, p. 137):

- proposed operational methods;
- a site plan of the area in which mining is to be undertaken;
- anticipated environmental impacts, proposed mitigation measures; and
- costs for reclamation proposals.

While the law governs that small-scale mining cannot take place without a license, in reality, there is little enforcement of the law and the majority of small-scale miners operating in Ghana do so illegally.

Drivers of ASM in Ghana

While small-scale gold mining in Ghana has increased in scale over the last few decades (Hilson & Potter 2003; Hilson 2010), gold mining is a traditional activity that has existed in Ghana for over 2000 years (Opoku-Antwi 2010). Different commentators place different



emphasis on the reasons that small-scale mining is so prevalent today, but the majority now agree that it can largely be attributed to poverty, and is driven by rising gold prices, high levels of unemployment, and agrarian reform causing a slump in agriculture (Aryee et al. 2003; Hilson 2009; Hilson & Garforth 2013).


In many rural areas throughout Ghana, small-scale mining has replaced subsistence agriculture as the primary income-earning activity (Hilson & Garforth 2013). Hilson and Garforth (2013) suggest that agricultural reforms in Ghana over the last three decades – such as the abolition of guaranteed minimum prices for maize and rice, the removal of subsidies for agricultural inputs, and increased emphasis on cash crops – have increased the number of rural families in Ghana turning to *galamsey* to supplement their farming incomes and purchase agricultural inputs. They highlight the interconnectedness between small-scale mining and smallholder farming in Southern Ghana, drawing on research conducted in the village of Kobriso and other areas in the Eastern Region. The authors assert that,

“[f]or many of Kobriso’s households, earnings from ASM have proved indispensable, enabling them to achieve desired levels of agricultural production, as well as address an array of other needs with relative ease” (Hilson & Garforth 2013, p. 349).

However, local government reports in small-scale mining districts do not appear to discuss the economic contribution of small-scale mining or the diminished economic importance of agriculture (Hilson & Garforth 2013):

“Small-scale mining is not portrayed in policy documents as the major rural economic activity and livelihood opportunity that it clearly is; on the contrary, it is vilified as part of the problem that is to be solved by a re-invigorated agricultural sector” (Hilson & Garforth 2013, p. 362).

The authors suggest that this could be due to a policy ‘lag’ – local government officers being unaware of or ignoring the changing economic context – or more likely, the negative media surrounding small-scale mining, which presents a one-sided view of small-scale mining as environmentally degrading and economically unsustainable. Because regulators largely view small-scale mining and smallholder farming as separate rather than interconnected economic activities, the linkages have not been taken into account by the government and donors, for example in Ghana’s Poverty Reduction Strategy Papers (PRSPs). The authors suggest that policies need to take into account the reality on the ground where rural households “are demonstrating the opportunities that come, for individual households and the local rural economy, from creative synergies between [small-scale mining] and farming. This situation calls for a more nuanced and positive policy stance towards [small-scale mining] and its interactions with smallholder agriculture” (Hilson & Garforth 2013, p. 362).



Low barriers to entry into small-scale mining also contribute to its popularity (McQuilken 2013). Structural adjustments in other Ghanaian sectors have meant that government workers and others who have lost their jobs have turned to small-scale mining to provide financial relief (McQuilken 2013). The diverse range of employment opportunities offered by ASM has been highlighted:

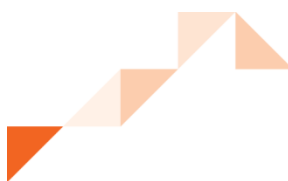
“A small-scale gold mining camp is one of the few places in Ghana where an itinerant farmer can be seen working side-by-side with a former government employee with a university degree” (Hilson & Garforth 2013, p. 357).

According to Hilson (2014), “[t]here are an estimated six downstream jobs ‘created’ per individual employed directly in the sector, a list of occupations which includes service people, such as taxi drivers, cooks and clothing merchants; semi-skilled labourers, including machine operators and repairmen; and skilled and educated groups, notably bookkeepers, accountants and technicians”.

Challenges for the Ghanaian Government in relation to ASM

There are numerous challenges associated with ASM in Ghana, including but not limited to:

- An increase in illegal small-scale mining activities, including illegal activities involving foreigners and using machinery that is more environmentally damaging than non-mechanised operations;
- Lack of knowledge of mineralised land suitable for ASM and demarcation/licensing of poorly mineralised concessions for ASM (Hilson & Maponga 2004);
- Sale of mineralized land to illegal miners by some chiefs and landowners in the mining communities that bypass official licensing processes;
- Lack of government capacity, including human resources for regulatory agencies to monitor and inspect small-scale mining activities (Aryee et al. 2003);
- Conflicts between large-scale mining companies and small-scale miners over access to mineralised land (Hilson & Yakovleva 2007; Okoh 2013);
- Mining in protected areas leading to loss of forests and biodiversity;
- Poor environmental management generally and the lack of rehabilitation of mines due to the *ad hoc* and illegal nature of activities;
- Miners’ lack of knowledge of, and/or resources to utilise, efficient processing techniques, leading to limited recovery of gold;
- The use of mercury, which has a range of health and environmental impacts, including the pollution of water sources;

- 
- The introduction of suction dredges on major rivers causing pollution and leading to high cost of water treatment for both domestic and commercial use, loss of biodiversity and health impacts for communities that depend on these water sources (Rivers 2013);
 - Poor health and safety management resulting in injuries and loss of life;
 - Child labour;
 - Lack of business acumen of small-scale miners; and
 - The inability of small-scale miners to access finance.

Illegality

Illegal operators work without a licence, have no concessions of their own and operate uncontrollably within the concessions of large-scale mining companies or in areas prohibited for mining such as forest reserves (Aryee et al. 2003). Most of Ghana's artisanal and small-scale miners operate illegally – the Minerals Commission has suggested that 80% of ASM operators engage in illegal activities (Ghana News Agency 2013). Even legally registered small-scale miners sometimes move into areas where they are do not have a license.

Banchirigah (2008) provides four reasons for the prevalence of *galamsey* (illegal gold mining) in Ghana: 1) a heavy involvement of traditional leaders in operations; 2) the mindsets of many operators toward alternative income-earning activities; 3) the numerous and diverse range of employment opportunities provided by the sector; and 4) the level of investment in operations. Other factors that are said to inadvertently discourage miners from obtaining a license include (Hilson & Potter 2005; Hilson et al. 2007b; Tschakert & Singha 2007; Banchirigah 2008; Hilson & Garforth 2013; McQuilken 2013):

- limited availability of viable land for ASM;
- the lack of knowledge of geological characteristics of land concessions awarded to small-scale gold miners (Hilson & Potter 2003);
- few opportunities to secure a mineral-rich plot of land and limitations on the size of mineralised land ASM operators are statutorily entitled to lease (Andrew 2003);
- difficulties in securing land tenure - the length of period for a small-scale mining license is a maximum of five years (Andrew 2003);
- high costs associated with obtaining a license, including having to prepare a site plan, obtaining an environmental permit, application forms and processing fees (Tschakert & Singha 2007);
- complex regulations and policies and lengthy bureaucratic procedures and waiting periods required to secure a license;
- the lack of access to finance and information;

- lack of access to support services and failure to take into account the needs of small-scale gold miners in support programs (Hilson & Potter 2003). Operating without a license prevents miners from accessing support services offered by the government to licensed miners, including microcredit, technological assistance and education (Hilson & Garforth 2013), however without these services, illegal miners are less likely to have the necessary resources to obtain a license (creating something of a vicious cycle).


Chinese presence in illegal small-scale mining in Ghana has also grown rapidly in the last decade, facilitated by Chinese-owned service companies operating in Ghana and bilateral agreements between the two governments. Recently, the Government of Ghana has assembled a National Task Force to “flush out” illegal miners, with a focus on foreign illegal miners (Hilson et al. 2014). However, Hilson et al. (2014) assert that this tactic does not address the root cause of the ASM problem, which is the sector’s informality. Informality is said to have encouraged miners to seek funding from foreign financiers and to have catalysed the inflow of Chinese citizens to the ASM sector, who form partnerships with local operators (Hilson et al. 2014).

Hilson and Potter (2003) argue that the government’s approach to dealing with illegal operators has been to either ignore those located in remote locations or to remove those operating on large-scale concessions. According to Banchirigah (2008), the three main approaches to reduce illegal mining in Ghana have been formalisation, military intervention and alternative livelihood projects. Military intervention tends to do little to deter artisanal and small-scale miners, and according to Hilson and Banchirigah (2009), can in fact unify those people marginalised by the state, leading to increasingly organised informal mining camps.

Hilson and Potter (2003, p. 265) argue that “increased geo-prospecting, provision of improved support services, and the implementation of re-skilling programmes, are keys to reducing illegal artisanal and small-scale gold mining in Ghana”. To do this, the Ghanaian government needs to “change its current approach towards the industry, and adopt a more accommodating, co-operative strategy toward its operators” (Hilson & Potter 2003, p. 265). However, according to Hilson et al. (2007a, p. 277), in terms of formalisation, “in-depth analysis of the Ghana experience promises to provide valuable guidance to policymakers confronted with the most problematic of cases”.

ASM and large-scale mining

There was an influx of large-scale multinational gold mining companies in Ghana in the early 1990s, stimulated by the Structural Adjustment Programme (Andrew 2003; Okoh 2013). While the Ghanaian government, with the support of donors, has been working to develop a “dual gold mining economy” consisting of both large-scale and small-scale mining, policymakers have prioritized the development of the foreign-financed large-scale



gold mining sector over the local-controlled small-scale mining sector, in their attempt to attract foreign investment (Hilson & Garforth 2013; Hilson et al. 2014). They have done this by prioritising large-scale mining in the allocation of lands, providing tax breaks to large-scale companies, and providing little in the way of support services for small-scale miners (Hilson & Garforth 2013; Hilson et al. 2014). The regulatory framework is also overly bureaucratic and complex, which discourages small-scale miners from formalisation their activities. The expansion of the large-scale gold mining industry has exacerbated the problem of small-scale mining by limiting the amount of land available for both agriculture and legal ASM activities (Hilson & Potter 2003; Hilson & Garforth 2013). According to Hilson et al (2007b, p. 415-416, citing Carson et al. 2005, p.4),

“Under reform, the large-scale mining and mineral exploration sector has expanded rapidly, using large tracts of land and in the process, ‘withdraw[ing] a significant percentage of the labour force from agriculture and other income-generating activities by taking farmland away and not providing enough jobs to match the number of people laid off from agriculture. Many of ‘the farmers and small-scale miners who lose their land to mining companies have very few means for survival in the formal economy’, and therefore engage in illegal mining, which provides the quickest means of securing income in Ghana's informal economy” .

Small-scale miners often operate illegally on the concessions of large-scale mining companies, and clashes between ASM groups and large-scale mining companies are common in Ghana (Hilson 2002; Okoh). While large-scale mining companies in Ghana often permit artisanal miners to work sections of their concessions, they often do so reluctantly and informally, without specific provisions/regulations in place (Hilson & Garforth 2013). See **Geological information and demarcating areas for ASM** for further information about large-scale companies allowing small-scale companies to work on their concessions in Ghana.

A workshop hosted with ICMM, the Ghana Chamber of Mines and Ghana Minerals Commission in 2009 (ICMM 2009a) identified some focus areas:

- The need for ASM to be regularized under Ghanaian Law.
- The need for permitting processes for ASM operators to less onerous.
- The need for ASM operators to gain better access to viable lands and geological information and analysis.
- The need for greater involvement of community and traditional leaders in managing ASM related issues.

Follow up actions identified from the workshop included creating a task force between large-scale mining companies and government to consider taking up the recommendations from the meeting.



Traditional authorities and customary land tenure

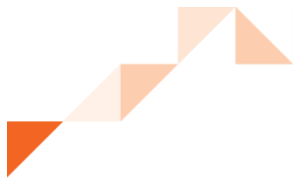
In Ghana, chiefs or traditional heads still largely control all rural lands, and customary land tenure practices play a significant role in the proliferation of small-scale mining (Hilson & Yakovleva 2007; Banchirigah 2008; Nyame & Blocher 2010). *Galamsey* will often claim that they have been given permission to work on land by traditional authorities, which often conflicts with the exclusive rights granted by the government to large-scale companies who have acquired a concession through legal channels (Hilson & Yakovleva 2007). Hirons (2013) discusses Ghana's move towards decentralisation and its impact on governance of the ASM sector. The author argues that integrating traditional sources of authority into decentralisation reforms is imperative if they are to have any substantive impact on ASM governance in Ghana. .

Health and environmental impacts

Land degradation and the pollution of water through *galamsey* activities is a major issue in Ghana, as is the use of mercury to process gold. According to Aryee et al. (2003), a major reason for poor environmental practices in ASM in Ghana is lack of self-generated funding as well as difficulties in securing access to credit facilities—shortages of finances leads to a reliance on cheap, haphazard and environmentally unfriendly operational methods. Because the source of financial assistance is the itinerant mineral buyer—legal or illegal—who is only interested in the minerals obtained and not really concerned about the environment, the funding generally does not cover environmental rehabilitation, but only extraction. In addition, ASM is not properly monitored by regulatory agencies such as the EPA and Minerals Commission (Friends of the Nation 2009).

There are many health issues associated with ASM, including the use of mercury, lack of occupational health and safety practices, and pit collapses which have caused a number of fatalities in recent years (Friends of the Nation 2009; HRW 2013; McQuilken 2013). Children are often present at mines sites, either accompanying their mothers or as workers (HRW 2013; McQuilken 2013). According to Human Rights Watch (2013), in 2006, about 10,000 children were working in ASM in Ghana.

It is common for small-scale miners to burn gold amalgam in the open air or poorly ventilated rooms and dispose of mine waste into river systems that communities are dependent on as a water source (Aryee et al. 2003). While education and training programs for small-scale gold miners on mercury pollution abatement is ongoing, including continuous efforts to encourage the use of retorts there use is not common among miners, for a number of reasons outlined in the section above on **Mercury retorts** (Aryee et al. 2003). While Ghana has committed to signing the **Minamata Convention on Mercury**, it has not yet done so, although civil society is strongly advocating for this to happen (Peacefmonline.com 2014), as well as to be involved in the development of its



National Action Plan to reduce mercury use and releases in ASM, which is a requirement of the convention.

The WPRs from Ghana, presented in the following section, focused on some of the topical issues raised above, namely the challenge of the interactions between ASM and large-scale mining; the largely informal nature of ASM activities and lack of access to support services; and the lack of environmental rehabilitation of mined lands.



Ghana Work Plans on Return (WPRs)

Three WPRs related to ASM have been presented at community relations and occupational health and safety courses in Australia by participants from Ghana:

1. Conflict resolution between the large scale mining companies and the artisanal miners
2. Upgrading mining technology in the small scale sector
3. Participatory evaluation of mine rehabilitation challenges in Ghana.

General progress and findings

At the time of data collection in late 2013 and early 2014, the three WPRs from Ghana were in the process of being implemented largely according to plan and had been relatively successful at achieving their aims, according to the participants of the courses who provided data on their progress. They were involved in Community Aspects of Resource Development and Environmental Management in Mining courses in Australia. Compared to the WPRs from Madagascar, these three WPRs showed more progress towards achieving their aims than most of the WPRs from Madagascar, which had been developed earlier, reflecting on the political stability of Ghana compared to Madagascar and the comparatively healthy state of civil society and the higher education sector, the two sectors from which these three participants hailed (two representing a civil society organisation closely connected with miners, and one from a university).

Detailed progress report

1. *Conflict resolution between the large scale mining companies and the artisanal miners*

Overview

This WPR had three objectives:

1. To foster trusting and harmonious relationships between large-scale and small-scale miners through consultative engagement by the end of November 2014.
2. To negotiate with large-scale mining companies to cede parts of their concessions to SAM operations through due process with regulators at the end of the project period.
3. To prepare a simplified handbook for mining license acquisition and mining best practices by the end of December 2013, to enable small-scale miners understand the license acquisition process and best mining practice.



Progress

The participant has engaged and come to an agreement with three large-scale mining companies, effectively achieving the first two objectives of the WPR. The handbook has not yet been completed. According to the participant, after lengthy discussions, two large-scale mining companies have agreed to cede part of their concessions to ASM, which has reduced confrontations between the two parties. A third company has had major resettlement issues with a nearby community – while housing has been constructed, the community is demanding access to their ancestral lands – and the participant has been involved in ongoing negotiations. The participant has also been working with the NGO Solidaridad and has been investigating alternative livelihoods initiatives for women in ASM, inspired by the session on gender during the course in Australia.

Positive aspects of the WPR

The participant has assisted in mitigating conflict between small-scale miners and three large-scale mining companies. He/she discussed being inspired by the fact that mining companies in Australia appear to co-exist peacefully with the community. The participant attributes his/her success to the fact that he/she is a small-scale miner him/herself and can talk to miners easily. The participant also holds a favourable community position, allowing him/her to mediate between the Minerals Commission and the companies.

Challenges

The participant believes that the ASM sector in Ghana is hampered by a lack of capacity and hopes there will be more opportunities for training, and particularly train-the-trainer courses, so that organisations to be able to work better with the ASM community.

Learning: implications for other projects

This WPR has been successful in part because the participant is a miner him/herself and has good knowledge of ASM on the ground, which has assisted him/her to gain access to other miners and build the necessary trust to implement programs with and for them. The success of this WPR has also been somewhat dependent on the position that this participant holds in the community, which has facilitated engagement with government agencies and large-scale companies, as well as miners. This highlights the importance of taking cultural traditions and hierarchies into account when attempting to implement initiatives aimed at ASM in countries like Ghana where customary land tenure practices and other cultural systems can have a powerful influence over their success or failure.



2. *Upgrading mining technology in the small scale sector*

Overview

The participant who developed this WPR works for an ASM network, which is a non-governmental organization that seeks to move small scale mining being the largest employer of unskilled labour and largely uncoordinated, to a well-organized and efficient mining industry. This WPR had the following outputs:

- Engage the national small-scale miners association, discuss, and define the proposal.
- Consult stakeholders relevant to technology development in small-scale mining.
- Formulate a training programme.
- Engage a consultant for the training.
- Write proposals for funding and secure funding sources.
- Plan and begin to implement a long-term project aimed at rehabilitating old mines to turn them into tourist attractions.

Progress


At the time of data collection in late 2013, the participant had discussed and defined the proposal (together with the author of the WPR above, which discusses large-scale mining). He/she had consulted with the board of the network and begun to connect them with the University of Mines and Technology (UMaT) in Tarkwa, with whom he/she had begun to create training modules to upgrade technology for ASM. A consultant for the training was yet to be engaged. The long-term plan to obtain an old mine and develop it as a tourist attraction, which had been inspired by visits he/she had made in Australia, had not been realised.

Positive aspects of the WPR

Upon returning home from the course in Australia, the participant was confronted with another area in ASM that required attention: conflict over access to land. The government had approached the network for assistance. The WPR above, 'Conflict resolution between the large scale mining companies and the artisanal miners' arose from these concerns – this participant's colleague undertook the Community Aspects of Resource Development course in the following intake.

Challenges

The participant had already acknowledged in the WPR that one of the major challenges of the WPR was going to be related to lack of literacy skills among the miners. For this reason, the participant and the UMAT team had to come up with a training model and



materials that could be used by miners who knew their job, had little time to attend training away from their site and who have few literacy skills. Unfortunately, ill health put this project on hold for some time.

Learning: implications for other projects

In any training project a thorough training needs analysis should be conducted with a representative pilot group. Care needs to be taken to establish the literacy status of participants and their availability for such training.

In addition, it is crucial to have a number of people involved in any big project so that if ill health strikes, the project can continue.

3. *Participatory evaluation of mine rehabilitation challenges in Ghana*

The aims of this WPR was to identify challenges facing post-mining landscape rehabilitation efforts for industrial and artisanal gold mining companies in South-West Ghana through participatory assessment and evaluation of current rehabilitation plans. The specific objectives included the following:


- Evaluate Ghana's regulation on rehabilitation and identify gaps in rehabilitation practices.
- Evaluate post-mining rehabilitation plans.
- Identify challenges responsible for failures.
- Provide recommendations.
- Recommend better practices aimed at effective rehabilitation

The WPR would adopt a participatory approach, which would include workshops, meetings, stakeholder consultations and community engagement. The review would set the basis for sustainable rehabilitation efforts to enhance post-mining landscape rehabilitation. It would advocate for more community involvement in rehabilitation processes and would influence mining policies and decision-making processes, potentially initiating an amendment to Ghana's EIA policy. The research could potentially be developed further to become a doctoral project.

The project would be implemented from March to September 2014, and would be communicated via seminars, conferences, stakeholder meetings, radio discussions and publications.

Progress

The WPR was developed in February 2014 and data collected in June 2014. At the time of data collection, the participant had visited two ASM sites to interact with community members engaged in ASM and make some contacts. However, no funding had been



obtained to implement the project (although an IM4DC Action Research proposal was submitted in June 2014 in an attempt to acquire funding – the outcome of this proposal was not known at the time of data collection).

Challenges

Funding was the main challenge for this WPR.

Positive aspects of the WPR

The WPR had led to an application for funding for an IM4DC Action Research Project, which was submitted as a collaborative effort between the University of Cape Coast, Ghana, and the University of Queensland, Australia, demonstrating the links and engagement fostered by both the IM4DC-funded training and the WPR process.

Learning implications for other projects

The WPR had not made significant enough progress for the participant to be able to comment on learning implications for other projects at the time progress data was collected.



Section Five: Conclusions and Recommendations

This section provides conclusions and recommendations for future strategic research and training approaches to key issues regarding ASM, as well as recommendations for facilitating the development of WPRs in the future.

Types of initiatives

Occupational Health and Safety, **Governance/Regulation** and **Environmental impacts** are key concerns of government officials and other stakeholders working to implement strategies to manage ASM. Such strategies mainly look to address a perceived lack of knowledge on the part of miners, lack of capacity on the part of government officials (e.g. inspectors) and to address gaps in legislation and its implementation. This was evidenced by training programs for miners being the most common initiative included in the WPRs, followed by guidelines and manuals, and initiatives aimed at amending or implementing legislation.

The key initiatives identified through the literature review, which were mirrored in the interviews and initiatives developed in the WPRs, were:

- Knowledge-based strategies
- Regularisation and formalisation of ASM
- Cooperatives and associations
- Training/capacity building programmes
- Strategies focused on mercury
- Financial assistance
- Fair Trade, Standards & Certification initiatives
- Beneficiation of resources
- Strategies to manage the intersection of ASM with large-scale mining
- Land rights/securing tenure for miners
- Reclamation of lands mined by small-scale miners
- Gender-focused initiatives
- Alternative livelihoods approaches/livelihood diversification

Most WPRs were practical in nature, with very few having only text-based outputs. Considering the abundance of literature focused on identifying the negative impacts of ASM and strategies to counter these that have *not worked* (with few identifying workable solutions or strategies that have *worked*), this is promising.



Training

Of the 34 WPRs, 12 (35%) focused on sensitisation, training or capacity building, with eight of these in the area of OH&S. While many of the WPRs contained some kind of training or sensitisation program, the majority took a conventional approach to doing so. For example, the majority of WPRs focused on providing textual-based information in training. Participants in courses could be encouraged to use a wider variety of techniques, including sensitisation programs via radio (which have been proven to be successful). For example, two WPRs specifically mentioned the use of alternative methods for presenting information to miners; one planned on using graphical/pictorial information to encourage the use of personal protective equipment (PPEs) in ASM and the other focused on encouraging formalisation through workshops which would be delivered using diagrammatic formats (e.g. maps, flowcharts, pictures).

Four WPRs aimed to incorporate train-the-trainer type programmes. Train-the-trainer programs were seen as an effective means of training larger numbers of people where resources were limited and also as a way to increase buy-in; miners were said to trust “their own” more than outsiders. Despite 10 of the 34 WPRs acknowledging that miners’ lack of trust, acceptance or understanding might provide a challenge to the implementation of their WPR, few mitigation strategies were incorporated in the WPRs to deal with these issues. Only one WPR specifically mentioned the importance of workplace culture in changing miners’ practices.

Understanding the level of literacy and education of potential training recipients, as well as understanding recipients’ availability for training, should both be considered by those developing WPRs focused on training programs.

The literature points to numerous failed training programs and technical interventions that have been introduced in ASM, suggesting that a training needs analysis conducted with representative pilot group could be a good addition to WPRs looking to incorporate training into their project, or simply for training programs targeting miners more broadly. Participatory processes should also be encouraged (see [Literature reviews, baseline studies and participatory approaches](#)).

Monitoring

The importance of monitoring ASM activities was highlighted in the literature, interviews and WPRs. Four WPRs focused on increasing the capacity of mines inspectors, with three of these looking to develop guidelines/manuals/checklists for mine inspectors.



Guidelines

Nine WPRs (26% of the total) across the different thematic areas included the development of guidelines/manuals/checklists – four in the area of OH&S, two in the area of governance and three in the area of environmental impacts. The importance of tailoring the language of guidance documents to the recipients (i.e. miners), was highlighted.

Government processes


The majority of the WPRs consisted of programs aimed at artisanal and small-scale miners themselves, rather than internally (e.g. improving government processes). This could be an area of focus for future WPRs and research/ training in ASM; that is, assisting governments to identify where they need to improve internal structures, as well as legislation, regulation and policies aimed at ASM – and, more importantly, their implementation – to create an ASM sector that benefits the economy and its people. The WPRs and literature did identify that legislation aimed at regulating the ASM sector is still deficient.

Mercury

Six of the 34 WPRs discussed the use of mercury and this was a key issue mentioned in the literature on ASM. The recent opening of the Minamata Convention on Mercury for signing in October 2013 will lead to the need for many signatories to develop national action plans, which are likely to provide the framework for future initiatives focused on mercury in a number of countries. Refer to the section on the **Minamata Convention on Mercury** for further information about the requirements to be contained in the country action plans, which provide ideas for future strategic research and training related to mercury, for example (UNEP 2013b):

- baseline research into the quantities of mercury used and the practices employed in ASM;
- research and training in strategies for promoting the reduction of emissions, releases and exposure to mercury in ASM;
- research into public health strategies related to mercury;
- research and training in strategies to prevent the exposure of vulnerable populations; and
- training to provide information to artisanal and small-scale miners and affected communities.

While many of these activities are already occurring in a number of countries, the need for more innovative strategies and investment in these still exists. The country action



plans will also require input from various stakeholders, including civil society and academic institutions.

Cooperatives in ASM

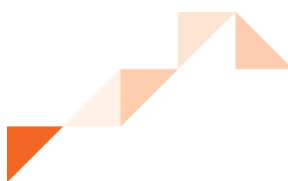
The formation of cooperatives as a way of facilitating formalisation of ASM and regulating the industry was a strategy raised in both the interviews and the literature. Two of the WPRs used the formation of cooperatives as a stepping-stone towards achieving broader goals. While the literature discussed cooperatives on a general level, there was a dearth of research reporting on the successes and failures of cooperatives in ASM to guide course participants on how to develop WPRs focused on the formation of cooperatives. It is therefore recommended that future research into ASM cooperatives – drawing from on-the-ground experiences and literature assessing cooperatives in other industries – be undertaken to draw out these lessons.


Gender and ASM

Very few of the WPRs mentioned gender-specific issues in ASM, even when they were prompted by the template used to develop the WPR. Only one WPR focused on gender, but the aim was to remove women from ASM rather than address gender issues within the sector more broadly. There are opportunities for research into women's motivations, their skills, the way they learn their trade, the contribution they make to poverty reduction, and the impacts mining activities have on them and their family's health and well-being. The rapid assessment toolkit *Gender Dimensions of Artisanal and Small-Scale Mining* (Eftimie et al. 2012) produced by the Oil, Gas, and Mining Policy Unit of the World Bank is a useful resource for participants of future courses who develop WPRs related to gender issues in ASM.

Work plan on return (WPR) process

According to Lawson (2013), the structure of the WPR template and the coaching received during the course provided the skills and confidence to participants to write and implement WPR, revising it where necessary. It also provided a scaffold to participants' learning across various phases and locations of the Australian aid-funded course. Bofinger (2013), too, observed that using the WPR was a good vehicle for post-course visits, as it provided a framework for understanding the impact of the course and the WPR on the workplace. The WPR is also a valuable tool for ensuring continuity throughout the courses. However, considering that the majority of WPRs had not been implemented at the time of data collection, some changes could be made in their design to make them more feasible. Some key recommendations for improving the WPR process include:

- 
- **Pre-planning:** It is important that participants are aware of the WPR before leaving their home country. The WPR should be discussed with supervisors before commencing the short course so that a viable and relevant project is selected. More careful involvement of the participant's supervisor at critical key points in the development of the WPRs is warranted.
 - **Aim for realistic outcomes:** Very few WPRs reviewed for this study had been implemented in the projected timeframes. Participants in courses in Australia should be encouraged to scope their project towards realistic outcomes given the timeframe and resources available to them.
 - **Coordinate projects and find synergies:** Where there are a number of participants from a single country or organisation, they should be encouraged to co-ordinate their projects so that the projects avoid overlap and benefit the overall situation in a complementary way. Course coordinators should encourage all participants to find synergies between their projects.
 - **Think about budget:** Participants should be aware of budget restraints when they are developing their WPR and course coordinators should encourage participants to think of creative ways to implement projects with a limited budget.
 - **Africa-focused course content:** More focus on ASM and on the African context in course content and delivery may assist participants to develop implementable WPRs based on 'tried and tested' initiatives.
 - **Allot time for WPR every day:** It is essential to weave the WPR through each day of the course, which may include setting aside time for participants to work on the WPR each day and encouraging reflection about it, for example after field trips.
 - **Action learning and peer coaching:** The action-learning paradigm works well for participants as they reflect on their WPR in light of their growing understanding. Peer coaching sessions are always successful where WPRs are presented to the group or in pairs for critical feedback.
 - **Consider availability of stakeholders:** WPRs that aim to involve a broad range of stakeholders may encounter delays related to the stakeholders' availability and the time involved in coordinating joint meetings and decision-making processes. This should be taken into account when considering the timeframes and deadlines of the project.
 - **Consider the political context and bureaucratic processes:** Political issues may delay the completion of the WPR, particularly if senior-level approval is required. Any WPR aiming to change or add to existing legislation will take additional time to implement due to bureaucratic processes that need to be followed. Participants



should think realistically about the timeframes for such projects and take into account the political context in their home countries and whether or not this is amenable to their WPR.

- **Stronger focus on monitoring and evaluation:** Participants should be encouraged to include methods for monitoring and evaluating their WPRs, to assist them to develop realistic objectives and to ensure that there is a way to measure the success of the project. Many of the WPRs lacked objectives that followed the ‘SMART’ criteria (specific, measurable, attainable, realistic, timely), making evaluation of the projects difficult.
- **Mechanism for sharing WPRs:** An electronic mechanism for sharing WPRs, particularly those related to similar themes e.g. ASM, would be valuable. M4DLink has begun to take this role and will hopefully continue to do so in the future.

These and other recommendations are discussed further below.


Literature reviews, baseline studies and participatory approaches

Not as many WPRs as might be expected included the collection of baseline data or needs analyses to ensure that initiatives under development were appropriate to the target audience. For example, one participant realised that the data he/she required to implement his/her WPR was simply not available, and as such had to add data collection as a step in their WPR upon return to their home country:

“I have found out that as opposed to large scale miners who are required to record the number injuries and/or fatalities in their monthly reports, there isn’t that provision with small scale miners hence decisions on small scale mining as far as health and safety is concerned are not based on concrete data.”

Other participants mentioned that their organisations at home (e.g. Ministry of Mines) wanted some form of evidence as to the need for the project that the WPR was proposing, which would require additional studies. It is thus recommended that participants be encouraged to include the collection of baseline data or needs analyses in their WPRs from the outset, and to include budget provisions for this, as fieldwork can be expensive and require human resources that simply are not available. Partnership with other organisations, for example, civil society, to carry out research could be considered.

In the least, participants should be encouraged to undertake a thorough literature review of the area they are planning to focus their WPR on, to draw on any lessons (and avoid potential mistakes) from other work in the same area. For example, the key recommendations for future projects aiming to develop a cooperative scheme provided by Levin and Turay (2008) in their analysis of the 2005 USAID project that created a



diamond mining cooperative scheme in Sierra Leone would be of benefit to individuals developing WPRs focused on forming cooperatives.

Care also needs to be taken by government officials and others looking to implement strategies in the area of ASM not to assume that they *know* the problems without first having first researched these; the issues in ASM are generally very context-specific. Participatory processes should also be encouraged.⁵ Only five out of the 12 training-based WPRs significantly incorporated participatory approaches that included the collection of data to determine the topics and best ways of training miners. As an example, one WPR in the area of governance/regulation planned on developing the topics for the training and the mode of delivery through a series of interactive multi-stakeholder focus groups. Participatory approaches appear to have assisted the progress of some WPRs by increasing stakeholder engagement and buy-in.

Many government officials in sub-Saharan Africa work in capital cities and are not aware of the issues on the ground in remote and rural areas where ASM is occurring. Incorporating literature reviews, baseline studies and participatory processes into WPRs is a good starting point to understand the types of strategies that will be of most benefit to the sector and miners themselves. This should be encouraged by course facilitators.


Stakeholders

The range of stakeholders identified as either the target audience for a given WPRs or being involved somehow in the implementation of the WPR was generally quite broad. Whilst in theory this would be positive as it means the project would consider a range of stakeholders, in practice this is often not achievable, especially in highly bureaucratic government departments. It may have contributed to the slow progress of many of the WPRs. For a number of WPRs, it was not clear was going to implement the project, as responsibilities for activities were not clearly defined. Some WPRs included over ten stakeholder groups, including a number of ministerial departments. It is recommended that course facilitators encourage participants to stick to a WPR that is aimed at their own department, with smaller, more achievable goals.

Human resource constraints were mentioned in a small number of WPRs but became a clearer issue upon collection of progress data. It was recommended that not only one person be responsible for an WPR, as there were incidences where the individuals who developed the WPR fell ill or had to take extended leave, and the WPR was halted.

The progress data revealed that the course participants acted as something of ‘internal champions’ in their workplaces, which assisted in the progress of the WPRs. This was

⁵ See <http://commdev.org/managing-risk-and-maintaining-license-operate-participatory-planning-and-monitoring-extractive> for a set of tools for teaching participatory planning and monitoring in the extractive industries – these could be adapted to ASM.



particularly the case for the WPRs focused on OH&S. Having gained knowledge in Australia, these employees were more respected in their workplaces and took on the role of championing certain causes. For example, a new section was created at the Ministry of Ethiopia to look at OH&S.

Template

Both Bofinger (2013) and Lawson (2013) noted having received positive feedback on the WPR template. During the post-course visits, there were no improvements to the template suggested by the participants and they reported finding the template easy to understand and use and useful in developing presentations of plans to supervisors and colleagues (Bofinger 2013). However, this study found that the template was not consistent across different courses or even within the same course, and many of the WPRs lacked key components that should be included in a project plan, such as timelines, budgets, clear activities or outputs, and plans for monitoring and evaluation.


A variety of templates could be provided to participants; more creative problem-based approaches could appeal to some learners, more than a formal report (Lawson 2013).⁶ There are also some project planning tools that could be incorporated into the template (refer to the following section).

SMART objectives and project planning tools

Many WPRs tended to have broad aims and objectives, and there was not clarity between the objectives of the WPRs themselves, and the broader aims. For example, one WPR aimed to develop environmental guidelines for ASM, as well as encourage miners to form cooperatives.

Many of the WPRs lacked objectives that followed the 'SMART' criteria (specific, measurable, attainable, realistic, timely). Objectives were often too broad to be achievable, and many WPRs contained multiple non-complimentary objectives. The aims of the WPRs were often markedly different from the objectives, desired impacts and activities, pointing to the need to clearly explain the difference between aims, objectives and activities prior to the development of WPRs. It was often necessary to look at the activities contained in the WPR to understand the key objectives, however, these activities would often not contribute to the key aims or objectives. The IPPF (2002, pp. 13-5) *Guide for Designing Results-Oriented Projects and Writing Successful Proposals* has some good tips on writing objectives and provides examples of poorly written objectives and how they can be improved.

⁶ For an example, please see <http://www.openideo.com/>



In addition, some WPRs seemed to assume that merely providing information to miners (for example, informing them on the dangers of mercury use) would necessarily lead to change (for example better OHS&E practices in terms of mercury). Such assumptions should be challenged by course facilitators. Tools such as Theory of Change,⁷ which assists project developers to explain how they plan to arrive at a given outcome and what assumptions they should take into account in development their project plan, could be useful in this respect.

Logical Framework Analysis (IPPF 2002, p. 11) could also be a useful tool in the development of WPRs in the future. In fact, there are many guides on writing community development projects from the development area,⁸ which may assist participants developing their WPRs.

It appears that generally, training on different tools for developing projects could be a useful addition to training programs funded by the Australian Aid program.

Monitoring and evaluation

There was a lack of monitoring and evaluation planning in the WPRs generally. When asked about how they will measure the success of their WPRs, many participants provided responses that revealed that they had not considered this aspect, or provided very general statements about measuring the success of the WPR by improvement in the area of focus, without providing any measures to determine this improvement. This is probably due to the only question attempting to capture evaluation in one of the WPR templates being 'How will you know your WPR has been successful?' It is recommended that further questions be added to this template to better capture how the project will be evaluated in concrete terms. Additional tools and templates to assist in developing a monitoring and evaluation plan could be provided.⁹

Some WPRs reviewed for this study included quarterly progress reports; these appeared to be amongst participants from the same course, suggesting that the facilitator may have mentioned the importance of including this aspect. This highlights the influential role of the course facilitator in the development of the WPR and ability to shape different components. It is recommended that facilitators emphasise the importance of including monitoring and evaluation in the WPRs as a way of ensuring that the objectives and activities are realistic.

⁷ See <http://www.theoryofchange.org/what-is-theory-of-change/> for further information.

⁸ See, for example, <http://commdev.org/all-sector/5081/all-related-resources>

⁹ See, for example, <http://commdev.org/monitoring-evaluation>



Barriers to WPR implementation

The top barriers identified by the WPRs themselves were:

- Funding
- Miners' lack of trust, acceptance or understanding
- Lack of political will or understanding of ASM on the ground
- Lack of support generally
- Resources (other than financial or human)
- Human Resources
- Education or literature levels.

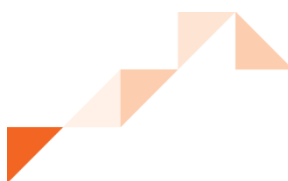
Cultural issues, political instability, security and infrastructure were not mentioned frequently in the WPRs as key barriers, but were recognised in retrospect by the project participant at the time of progress data collection as of high importance. For example, in Madagascar, political instability was the fundamental barrier to the implementation of the eight WPRs.

Risk assessment control measures and mitigation strategies (management of risk in the future) were largely absent from the WPRs. Mitigation strategies for expected challenges and barriers to WPR implementation were only provided for around 15 of the 34 WPRs. It is recommended that the course facilitators place more emphasis on identifying risks and barriers to the WPRs and, more importantly, mitigation strategies, which will assist in the implementation of the WPRs in the face of challenges in the future.



References

- Adler Miserendino, R, Bergquist, BA, Adler, SE, Guimarães, JRD, Lees, PSJ, Niquen, W, Velasquez-López, PC & Veiga, MM 2013, 'Challenges to measuring, monitoring, and addressing the cumulative impacts of artisanal and small-scale gold mining in Ecuador', *Resources Policy*, vol. 38, no. 4.
- Amankwah, RK & Anim-Sackey, C 2003, 'Strategies for sustainable development of the small-scale gold and diamond mining industry of Ghana', *Resources Policy*, vol. 29, no. 3–4, pp. 131-8.
- Amazing Zambia 2010, *Kaingu Gem Mines & Jewelry (Puku Pan)*, Amazing Zambia, <<http://www.amazingzambia.com/social-responsibility/41-kaingu-gem-mines-a-jewelry-puku-pan>>.
- Amoah, AK 2012, 'Sand winning destroys arable lands', *Ghanaian Chronicle*, May 3, 2012.
- Andrew, JS 2003, 'Potential application of mediation to land use conflicts in small-scale mining', *Journal of Cleaner Production*, vol. 11, no. 2, pp. 117-30.
- AngloGold Ashanti 2006, *AngloGold Ashanti's approach to artisanal and small-scale mining*, Report to Society <<http://www.anglogold.com/subwebs/informationforinvestors/reporttosociety06/files/artisanal-mining.pdf>>.
- Appiah, H 1998, 'Organization of Small-scale Mining Activities in Ghana', *The Journal of the South African Institute of Mining and Metallurgy*, vol. 98, no. 7, pp. 307-10.
- ARM 2013a, *Fair Trade, Standards & Certification Initiatives* Alliance for Responsible Mining (ARM), viewed 02/05/2014, <<http://communitymining.org/en/for-miners/fairmined-mining-certification/21-recursos/38-fair-trade-standards-certification-initiatives>>.
- ARM 2013b, *Fairtrade & Fairmined Standard* Alliance for Responsible Mining, viewed 28/06/2014, <<http://www.communitymining.org/en/our-work/standard-setting/history-and-processes/fairtrade-and-fairmined-standard>>.
- Aryee, BNA, Ntibery, BK & Atorkui, E 2003, 'Trends in the small-scale mining of precious minerals in Ghana: a perspective on its environmental impact', *Journal of Cleaner Production*, vol. 11, no. 2, pp. 131-40.
- 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*, vol. 34, no. 1–2, pp. 64-70.
- Banchirigah, SM 2008, 'Challenges with eradicating illegal mining in Ghana: A perspective from the grassroots', *Resources Policy*, vol. 33, no. 1, pp. 29-38.



Banchirigah, SM & Hilson, G 2010, 'De-agrarianization, re-agrarianization and local economic development: Re-orientating livelihoods in African artisanal mining communities', *Policy Sciences*, vol. 43, no. 2, pp. 157-80.

Binali, A 2012, 'Analysis on the Effect of Using Mercury in Artisanal and Small Scale Gold Mining in Tanzania, Case study Chunya - Mbeya (Unpublished Return to Work Project) ', University of Queensland

Bofinger, C 2013, *Evaluation Report Occupational Health and Safety Short Course 2012: Post Course Visits, March 2013*, UniQuest Pty Limited, University of Queensland, Australia Brisbane.

Bosse Jønsson, J, Charles, E & Kalvig, P 2013, 'Toxic mercury versus appropriate technology: Artisanal gold miners' retort aversion', *Resources Policy*, vol. 38, no. 1, pp. 60-7.

Buxton, A 2013, *Responding to the challenge of artisanal and small-scale mining: How can knowledge networks help?*, IIED, London<<http://pubs.iied.org/16532IIED.html> >.

Calton Projects n.d., 'Overview of mining laws in Ghana', Calton Projects Ltd

Canavesio, R 2010, 'Exploitation informelle des pierres precieuses et development dans les nouveaux pays producteurs. Les cas des front pionniers d' Illakaka Madagascar', Doctor of Philosophy thesis, L'Universite Michel de Montagne Bordeaux III.

Carson, M, Cottrell, S, Dickman, J, Gummerson, E, Lee, T, Miao, Y, Teranishi, N, Tully, C & C. Uregian 2005, *Managing Mineral Resources through Public-Private Partnerships: Mitigating Conflict in Ghanaian Gold Mining (Working Paper WWS591)*, Woodrow Wilson School of Public and International Affairs, Princeton University, New Jersey.


Cartier, LE 2009, 'Livelihoods and production cycles in the Malagasy artisanal ruby-sapphire trade: A critical examination', *Resources Policy*, vol. 34, no. 1-2, pp. 80-6.

Chaparro Ávila, E 2003, *Small-scale mining: a new entrepreneurial approach*, Comisión Económica para América Latina (CEPAL), United Nations, Santiago, Chile<<http://www.eclac.org/publicaciones/xml/1/13901/Lcl1834i.pdf> >.

Childs, J 2008, 'Reforming small-scale mining in sub-Saharan Africa: Political and ideological challenges to a Fair Trade gold initiative', *Resources Policy*, vol. 33, no. 4, pp. 203-9.

Choyt, M 2014, *Fair Jewelry: Making a difference from mine to market*, Modern Jeweler, 2/02/2014, <[http://www.modernjeweler.com/print/Modern-Jeweler/Fair-Jewelry/1\\$606](http://www.modernjeweler.com/print/Modern-Jeweler/Fair-Jewelry/1$606)>.

Cook, R & Healy, T 2012, *Madagascar Case Study: Artisanal mining rushes in protected areas and a response toolkit*



CSIRO 2011, *Mineral processing and agglomeration*, Commonwealth Scientific and Industrial Research Organisation (CSIRO), <<http://www.csiro.au/Organisation-Structure/Divisions/Process-Science-and-Engineering/mineral-processing-agglomeration/Mineral-beneficiation.aspx>>.

Department of Mineral Resources, RoSA 2011a, *Beneficiation Economics*, Department of Mineral Resources, Republic of South Africa <<http://www.dmr.gov.za/beneficiation-economics.html>>.

Department of Mineral Resources, RoSA 2011b, *A Beneficiation Strategy for the Minerals Industry of South Africa*.

Dondeyne, S, Ndunguru, E, Rafael, P & Bannerman, J 2009, 'Artisanal mining in central Mozambique: Policy and environmental issues of concern', *Resources Policy*, vol. 34, no. 1-2, pp. 45-50.

Duffy, R 2007, 'Gemstone Mining in Madagascar: Transnational Networks, Criminalisation and Global Integration', *The Journal of Modern African Studies*, vol. 45, no. 2, pp. 185-206.

Eftimie, A, Heller, K, Strongman, J, Hinton, J, Lahiri-Dutt, K & Mutemeri, N 2012, *Gender Dimensions of Artisanal and Small-Scale Mining: A Rapid Assessment Toolkit*, World Bank Group's Oil, Gas, and Mining Unit, Sustainable Development Network, Sustainable Energy Department<http://siteresources.worldbank.org/INTEXTINDWOM/Resources/Gender_and_ASM_Toolkit.pdf>.

Estelle Levin Ltd 2012, *Understanding Artisanal & Small-Scale Mining in Protected Areas and Critical Ecosystems: A growing global phenomenon. Presentation for ASM Protected and Critical Ecosystems London Roundtable November 2012*.


Fair Trade Silver n.d, *Sisterhood with Tanzanian Gem Miners*, <<http://ethical-fair-trade.org/fair-trade-silver/10-gemstyles-company-profile/>>.

Fold, N, Jønsson, JB & Yankson, P 2013, 'Buying into formalization? State institutions and interlocked markets in African small-scale gold mining', *Futures*.

Friends of the Nation 2009, 'Rights and Voices for Sustainable Small-Scale Mining: Proposal Submitted to KASA, May 2009'.

Friends of the Nation 2010, 'End of Project Report: Rights and Voices for Sustainable Small-Scale Mining ', Friends of the Nation, Takoradi, Ghana

2009, *Communique issued at the end of the policy dialogue workshop organised by the Ghana Chamber of Mines in Collaboration with BUSAC Fund on Mainstreaming Artisanal and Small Scale Mining in Ghana held o Tuesday, 24th November 2009 at M'Paza Hotel, Accra*, by Ghana Chamber of Mines.



Ghana Chamber of Mines 2012, *Performance of the Mining Industry 2012*, Ghana Chamber of Mines, Accra,
Ghana<http://ghanachamberofmines.org/media/publications/Performance_of_the_Ghana_Mining_Industry_in_2012.pdf>.

Ghana Chamber of Mines 2013, *Performance of the Mining Industry in 2013* Ghana Chamber of Mines, Accra,
Ghana<http://ghanachamberofmines.org/media/publications/Performance_of_the_Mining_Industry_in_2013.pdf>.

Ghana News Agency 2011, 'One million people are involved in artisanal mining in Ghana', *Ghana News Agency* 1/12/2011.

Ghana News Agency 2012, 'New mining regulations to address hazards', *ModernGhana.com*, 25 October 2012

Ghana News Agency 2013, 'Only 20% small-scale miners operate legally - Commission', *Ghana News Agency* 14/06/2013.

Glaser, BG & Strauss, AL 1967, *The discovery of grounded theory: strategies for qualitative research* Weidenfeld and Nicolson, London.

Harris, RP, Tallichet, SE & Redlin, MM 2003, 'What's a Woman to do? Globalized Gender Inequality in Small-Scale Mining', in G Hilson (ed.), *The Socio-Economic Impacts of Artisanal and Small Scale Mining in Developing Countries*, Taylor & Francis, pp. 205-19.

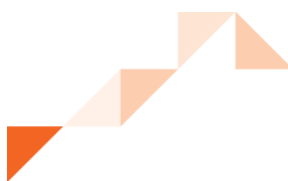
Hayes, K & Perks, R 2011, *Women in the artisanal and small-scale mining sector of the Democratic Republic of the Congo. High Value Natural Resources and Post Conflict Peacebuilding.*, Earth Scan Publications.

Heemskerk, M 2005, 'Collecting data in artisanal and small-scale mining communities: Measuring progress towards more sustainable livelihoods', *Natural Resources Forum*, vol. 29, no. 1, pp. 82-7.

Hentschel, T, Hruschka, F & M., P 2002, *Mining, minerals and sustainable development (MMSD) project — global report on small-scale mining. International Institute for Environment and Development (IIED) Working Paper No.70*, IIED and WBCSD<<http://pubs.iied.org/pdfs/G00723.pdf>>.

Hilson, G 2001, *A Contextual Review of the Ghanaian Small-scale Mining Industry*, International Institute for Environment and Development (IIED) and World Business Council for Sustainable Development (WBCSD), London
<<http://pubs.iied.org/pdfs/G00722.pdf>>.

Hilson, G 2002, 'Land use competition between small- and large-scale miners: a case study of Ghana', *Land Use Policy*, vol. 19, no. 2, pp. 149-56.



Hilson, G 2006, 'Abatement of mercury pollution in the small-scale gold mining industry: Restructuring the policy and research agendas', *Science of the Total Environment*, vol. 362, no. 1-3, pp. 1-14.

Hilson, G 2007, 'What is wrong with the Global Support Facility for small-scale mining?', *Progress in Development Studies*, vol. 7, no. 3, pp. 235-49

Hilson, G 2008, 'Fair trade gold': Antecedents, prospects and challenges', *Geoforum*, vol. 39, no. 1, pp. 386-400.

Hilson, G 2009, 'Small-scale mining, poverty and economic development in sub-Saharan Africa: An overview', *Resources Policy*, vol. 34, no. 1-2, pp. 1-5.

Hilson, G 2010, 'Once a miner, always a miner': Poverty and livelihood diversification in Akwatia, Ghana', *Journal of Rural Studies*, vol. 26, no. 3, pp. 296-307.

Hilson, G & Ackah-Baidoo, A 2011, 'Can Microcredit Services Alleviate Hardship in African Small-scale Mining Communities?', *World Development*, vol. 39, no. 7, pp. 1191-203.

Hilson, G & Banchirigah, SM 2009, 'Are Alternative Livelihood Projects Alleviating Poverty in Mining Communities? Experiences from Ghana', *The Journal of Development Studies*, vol. 45, no. 2, pp. 172-96.

Hilson, G & Garforth, C 2013, 'Everyone Now is Concentrating on the Mining': Drivers and Implications of Rural Economic Transition in the Eastern Region of Ghana', *Journal of Development Studies*, vol. 49, no. 3, pp. 348-64.


Hilson, G, Hilson, A & Adu-Darko, E 2014, 'Chinese participation in Ghana's informal gold mining economy: Drivers, implications and clarifications', *Journal of Rural Studies*, vol. 34, no. 0, pp. 292-303.

Hilson, G, Hilson, CJ & Pardie, S 2007a, 'Improving awareness of mercury pollution in small-scale gold mining communities: Challenges and ways forward in rural Ghana', *Environmental Research*, vol. 103, no. 2, pp. 275-87.

Hilson, G & Maponga, O 2004, 'How has a shortage of census and geological information impeded the regularization of artisanal and small-scale mining?', *Natural Resources Forum*, vol. 28, no. 1, pp. 22-33.

Hilson, G & McQuilken, J 2014, 'Four decades of support for artisanal and small-scale mining in sub-Saharan Africa: A critical review', *The Extractive Industries and Society*, no. 0.

Hilson, G & Pardie, S 2006, 'Mercury: An agent of poverty in Ghana's small-scale gold-mining sector?', *Resources Policy*, vol. 31, no. 2, pp. 106-16.



Hilson, G & Potter, C 2003, 'Why is illegal gold mining activity so ubiquitous in rural Ghana?', *African Development Review-Revue Africaine De Developpement*, vol. 15, no. 2-3, pp. 237-70.

Hilson, G & Potter, C 2005, 'Structural adjustment and subsistence industry: Artisanal gold mining in Ghana', *Development and Change*, vol. 36, no. 1, pp. 103-31.

Hilson, G & Yakovleva, N 2007, 'Strained relations: A critical analysis of the mining conflict in Prestea, Ghana', *Political Geography*, vol. 26, no. 1, pp. 98-119.

Hilson, G, Yakovleva, N & Banchirigah, SM 2007b, 'To move or not to move': Reflections on the resettlement of artisanal miners in the Western Region of Ghana', *African Affairs*, vol. 106, no. 424, pp. 413-36.

Hilson, GH 2003, 'Gold Mining as Subsistence: Ghana's Small-Scale Miners Left Behind', *Cultural Survival*, vol. 27, no. 1.

Hinton, J 2006, *Communities and small scale mining: an integrated review for development planning. Report to the World Bank, Communities and Small-Scale Mining (CASM) Initiative*, Washington DC<<http://www.eisourcebook.org/cms/June%202013/CASM,%20an%20Integrated%20Review%20for%20Development%20Planning.pdf>>.

Hinton, J & Hollestelle, MR 2012, *Methodological Toolkit for Baseline Assessments and Response Strategies to Artisanal and Small-Scale Mining in Protected Areas and Critical Ecosystems* World Wide Fund for Nature (WWF) and Estelle Levin Limited<<http://www.profor.info/sites/profor.info/files/docs/Methodological%20Toolkit.pdf>>.


Hinton, JJ, Hinton, BE & Veiga, MM 2006, 'Women in Artisanal and Small Scale Mining in Africa', in K Lahiri-Dutt (ed.), *Women Miners in Developing Countries: Pit Women and Others*, Ashgate, Aldershot, England, pp. 209-25.

Hinton, JJ, Veiga, MM & Beinhoff, C 2003a, 'Women and artisanal mining: Gender roles and the road ahead', *Socio-Economic Impacts of Artisanal and Small-Scale Mining in Developing Countries*, pp. 161-203.

Hinton, JJ, Veiga, MM & Veiga, ATC 2003b, 'Clean artisanal gold mining: a utopian approach?', *Journal of Cleaner Production*, vol. 11, no. 2, pp. 99-115.

Hirons, M 2013, 'Decentralising natural resource governance in Ghana: Critical reflections on the artisanal and small-scale mining sector', *Futures*, no. 0.

HRW 2013, 'Ghana: Mine Accident Highlights Risk to Children: Enforce Safety Standards, Prevent Child Labor in Artisanal Gold Mining'.



ICMM 2009a, 'ICMM workshop on Artisanal and Small-Scale Mining (ASM) and Mining Companies', Coconut Grove Resort, Elmina, Ghana 12-14 May 2009, <<http://www.icmm.com/document/919>>.

ICMM, C, IFC-CommDev 2009b, *Working together – how large-scale miners can engage with artisanal and small-scale miners*, International Council on Mining and Metals (ICMM), Communities and Small-scale Mining (CASM) and IFC Oil, Gas and Mining Sustainable Community Development Fund <<http://www.icmm.com/document/789>>.

IIED 2013, *Toward Inclusive, Sustainable Artisanal and Small-Scale Mining (ASM)*, IIED ASM Knowledge Programme, 2013-2018, International Institute for Environment and Development (IIED) <<http://pubs.iied.org/pdfs/G03719.pdf>>.

ILO 1999, *Social and Labour Issues in Small-Scale Mines. Report for Discussion at the Tripartite Meeting on Social and Labour Issues in Small-Scale Mines*, International Labour Organization, Sectoral Activities Program, International Labour Office, Geneva <http://www.ilo.org/public/libdoc/ilo/1999/99B09_35_engl.pdf>.

ILO 2003, *Facts on Small-Scale Mining*, International Labour Organization, <http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/publication/wcms_067582.pdf>.

IPPF 2002, *Guide for Designing Results-Oriented Projects and Writing Successful Proposals*, International Planned Parenthood Federation, Western Hemisphere Region, Inc. <<https://www.ippfwhr.org/en/publications/guide-for-designing-results-oriented-projects-and-writing-successful-proposals>>.

Kessler, R 2013, 'The Minamata Convention on Mercury: A First Step toward Protecting Future Generations', *Environmental Health Perspectives*, vol. 121, no. 10.

Lahiri-Dutt, K 2004, 'Informality in mineral resource management in Asia: Raising questions relating to community economies and sustainable development', *Natural Resources Forum*, vol. 28, no. 2, pp. 123-32.

Lawson, L 2013, 'Post Course Report: Managing Corporate Community Relations, Short Course Semester 1 2012', Uniquet, University of Queensland.

Levin, E & Turay, AB 2008, *Artisanal diamond cooperatives in Sierra Leone: Success or failure? Report commissioned by Partnership Africa Canada*, Ottawa <http://www.pacweb.org/Documents/ddi-publications/ddi-sierra_leone_cooperatives_study-2008-06-eng.pdf>.

Lowe, S 2005, *Consolidated report: Small-scale gold mining in the Guianas. Report prepared for the WWF.*, Guianas, Paramaribo.

Maconachie, R & Hilson, G 2011, 'Safeguarding livelihoods or exacerbating poverty? Artisanal mining and formalization in West Africa', *Natural Resources Forum*, vol. 35, no. 4, pp. 293-303.



Malawi Ministry of Mining 2013, *Mines and Minerals Policy of Malawi*, Ministry of Mining, Republic of Malawi, Lilongwe, Malawi<<http://www.eisourcebook.org/cms/Malawi%20Mines%20%26%20Minerals%20Policy%202013.pdf>>.

McQuilken, J 2013, *Ghana, Galamsey and Gender - the potential for artisanal and small-scale mining to create wealth and alleviate poverty in the region?*, 23/04/2013, Coffey International Ltd. , 23/04/2013, <http://blog.coffey.com/post/48667474688/ghana-galamsey-and-gender-the-potential-for#disqus_thread>.

MINTEK 2011a, *About Small Scale Mining & Beneficiation Division*, MINTEK, <<http://www.mintek.co.za/technical-divisions/small-scale-mining-beneficiation/about-small-scale-mining-beneficiation-division/>>.

MINTEK 2011b, *IGoli*, MINTEK, viewed 01/01/2014, <<http://www.mintek.co.za/technical-divisions/small-scale-mining-beneficiation/technology-development/igoli/>>.

Nyame, FK, Andrew Grant, J & Yakovleva, N 2009, 'Perspectives on migration patterns in Ghana's mining industry', *Resources Policy*, vol. 34, no. 1–2, pp. 6-11.

Nyame, FK & Blocher, J 2010, 'Influence of land tenure practices on artisanal mining activity in Ghana', *Resources Policy*, vol. 35, no. 1, pp. 47-53.

Nyame, FK & Grant, JA 2012, 'From carats to karats: explaining the shift from diamond to gold mining by artisanal miners in Ghana', *Journal of Cleaner Production*, vol. 29-30, pp. 163-72.


Nyame, FK & Grant, JA 2014, 'The political economy of transitory mining in Ghana: Understanding the trajectories, triumphs, and tribulations of artisanal and small-scale operators', *The Extractive Industries and Society*, vol. 1, no. 1, pp. 75-85.

OECD 2013, *Madagascar - African Economic Outlook* OECD, viewed 28/01/2014, <<http://www.africaneconomicoutlook.org/fileadmin/uploads/aeo/2013/PDF/Madagascar%20-%20African%20Economic%20Outlook.pdf>>.

Okoh, GA 2013, 'Grievance and conflict in Ghana's gold mining industry: The case of Obuasi', *Futures*, no. 0.

Opoku-Antwi, GL 2010, 'Three Essays on Small-Scale Gold Mining Operations in Ghana: An Integrated Approach to Benefit-Cost Analysis', Doctor of Philosophy (PhD) thesis, Kwame Nkrumah University of Science and Technology

Peacefmonline.com 2014, 'Use Of Mercury, Slowly Killing Small Scale Miners In Ghana', 1/06/2014.



Pelon, R 2010, *A la recherche des trésors de la Grande Ile : les ressources minérales in Madagascar : vers un agenda de relance économique*, La Banque Mondiale.

Peru Support Group 2012, *Artisanal and Small-scale Mining in Peru: A Blessing or a Curse?*, Peru Support Group <<http://www.perusupportgroup.org.uk/files/fckUserFiles/file/Artisanal%20and%20Small-scale%20Gold%20Mining%20in%20Peru.pdf>>.

Rivers, EC 2013, 'An Introduction of Artisanal Mining-Africa Network for IM4DC Community Aspects of Resource Development (CARD) Short Course, 8 July - 2 August 2013'.

Seda Platinum Incubator 2014, *About Us*, Seda Platinum Incubator, <<http://spi.org.za/about-us/>>.

SEED Initiative Oro Verde® <<http://www.seedinit.org/awards/all/oro-verde.html>>.

Sheldon, CG 2013, 'Broad-Based Training and Small Grants: Changing Lives of Artisanal Miners and Mining Communities in Uganda', in CG Sheldon, AZ Casis, GCaV Seiler & FR Mier (eds), *Innovative Approaches for Multi-Stakeholder Engagement in the Extractive Industries*, World Bank, Washington DC.

Shirimori/, D 2006, *AKATSI N: Use quarry, sand winning to increase revenue-Chief* ghanadistricts.com, viewed 13/05/2014, <<http://www.ghanadistricts.com/news/?read=53010&sports>>.

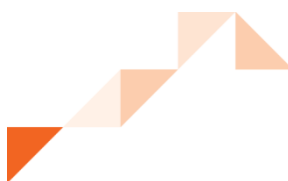
Siegel, S 2007, 'The Needs of Miners: Political Ethics, Mercury Abatement, and Intervention in Artisanal Gold Mining Communities', Doctor of Philosophy (PhD) thesis, University of British Columbia.

Siegel, S & Veiga, MM 2009, 'Artisanal and small-scale mining as an extralegal economy: De Soto and the redefinition of "formalization"', *Resources Policy*, vol. 34, no. 1-2, pp. 51-6.

Siegel, S & Veiga, MM 2010, 'The myth of alternative livelihoods: artisanal mining, gold and poverty', *International Journal of Environment and Pollution*, vol. 41, no. 3, pp. 272-88.

Sippl, K & Selin, H 2012, 'Global Policy for Local Livelihoods: Phasing Out Mercury in Artisanal and Small-Scale Gold Mining', *Environment: Science and Policy for Sustainable Development*, vol. 54, no. 3, pp. 18-29.

Sousa, RN, Veiga, MM, Klein, B, Telmer, K, Gunson, AJ & Bernaudat, L 2010, 'Strategies for reducing the environmental impact of reprocessing mercury-contaminated tailings in the artisanal and small-scale gold mining sector: insights from Tapajos River Basin, Brazil', *Journal of Cleaner Production*, vol. 18, no. 16-17, pp. 1757-66.



Spiegel, SJ 2009, 'Socioeconomic dimensions of mercury pollution abatement: Engaging artisanal mining communities in Sub-Saharan Africa', *Ecological Economics*, vol. 68, no. 12, pp. 3072-83.

Spiegel, SJ 2012a, *Formalisation policies, informal resource sectors and the de-/re-centralisation of power: Geographies of inequality in Africa and Asia*, Center for International Forestry Research, Bogor, Indonesia.

Spiegel, SJ 2012b, 'Microfinance services, poverty and artisanal mineworkers in Africa: In search of measures for empowering vulnerable groups', *Journal of International Development*, vol. 24, no. 4, pp. 485-517.

Spiegel, SJ, Savornin, O, Shoko, D & Veiga, MM 2006, 'Mercury Reduction in Munhena, Mozambique: Homemade Solutions and the Social Context for Change', *International Journal of Occupational and Environmental Health*, no. 3, pp. 215-21

Spiegel, SJ & Veiga, MM 2010, 'International guidelines on mercury management in small-scale gold mining', *Journal of Cleaner Production*, vol. 18, no. 4, pp. 375-85.

Times of Zambia 2011, 'Zambia: Women in Mining Seal Emerald Deal', *The Times of Zambia*.

Tschakert, P 2009, 'Recognizing and nurturing artisanal mining as a viable livelihood', *Resources Policy*, vol. 34, no. 1-2, pp. 24-31.

Tschakert, P & Singha, K 2007, 'Contaminated identities: Mercury and marginalization in Ghana's artisanal mining sector', *Geoforum*, vol. 38, no. 6, pp. 1304-21.

UNEP 2013a, *Global Mercury Assessment: Sources, Emissions, Releases and Environmental Transport*, Chemicals Branch, United Nations Environment Programme, Geneva, Switzerland<Chemicals Branch, United Nations Environment Programme>.

UNEP 2013b, *Minamata Convention on Mercury: Texts and Annexes*, United Nations, Geneva<<http://www.mercuryconvention.org/Portals/11/documents/publications/MinamataConventiontextEn.pdf>>.

UNEP 2014, *Convention UNEP Minamata Convention on Mercury*, viewed 20/05/2014 2014, <<http://www.mercuryconvention.org/Convention/tabid/3426/Default.aspx>>.

UNEP and Artisanal Gold Council 2012, *Reducing Mercury Use in Artisanal and Small-Scale Gold Mining: A Practical Guide*, United Nations Environment Programme Nairobi, Kenya<http://www.unep.org/chemicalsandwaste/Portals/9/Mercury/Documents/ASGM/Techdoc/UNEP%20Tech%20Doc%20APRIL%202012_120608b_web.pdf>.

UNIDO 2013a, *Mercury programme*, United Nations Industrial Development Organization, viewed 1/06/2014, <<http://www.unido.org/en/what-we-do/environment/resource-efficient-and-low-carbon-industrial-production/watermanagement/mercury.html>>.



UNIDO 2013b, *UNIDO & Mercury*, United Nations Industrial Development Organization (UNIDO), Vienna, Austria<http://www.unido.org/fileadmin/user_media_upgrade/What_we_do/Topics/Resource-efficient__low-carbon_production/201312_mercury_final_web.pdf >.

United Nations 2009, *A Report on Ghana's Mining Sector for the 18th Session of the UN Commission on Sustainable Development*, <http://www.un.org/esa/dsd/dsd_aofw_ni/ni_pdfs/NationalReports/ghana/Mining.pdf>.

USAID 2010, *Property Rights and Artisanal Diamond Development (PRADD) Project – Comparative study: legal and fiscal regimes for artisanal diamond mining*, USAID, Washington DC<http://usaidlandtenure.net/sites/default/files/USAID_Land_Tenure_PRADD_CAR_Fiscal_and_Legal_Regimes.pdf>.

USAID 2013, *End-Line Survey Results - Revised Property Rights and Artisanal Diamond Development (PRADD) in Liberia*, USAID<http://usaidlandtenure.net/sites/default/files/USAID_Land_Tenure_PRADD_Liberia_End-Line_Survey.pdf>.

Veiga, MM, Angeloci, G, Hitch, M & Colon Velasquez-Lopez, P 2014, 'Processing centres in artisanal gold mining', *Journal of Cleaner Production*, vol. 64, no. 0, pp. 535-44.

Veiga, MM, Maxson, PA & Hylander, LD 2006, 'Origin and consumption of mercury in small-scale gold mining', *Journal of Cleaner Production*, vol. 14, no. 3–4, pp. 436-47.

Werthmann, K 2009, 'Working in a boom-town: Female perspectives on gold-mining in Burkina Faso', *Resources Policy*, vol. 34, no. 1, pp. 18-23.

West Akim District Assembly 2006, *about West Akim Municipal*, West Akim District Assembly, <http://www.westakim.ghanadistricts.gov.gh/?arrow=atd&_=76&sa=3444>.

WHO 2013, *Mercury and health, Fact sheet N°361*, WHO, viewed 02/04/2014, <<http://www.who.int/mediacentre/factsheets/fs361/en/>>.

World Bank 2012a, *Nigeria - Sustainable Management of Mineral Resources Project*. Washington DC : World Bank..
<http://documents.worldbank.org/curated/en/2012/11/17058502/nigeria-sustainable-management-mineral-resources-project> World Bank, Washington DC
<<http://documents.worldbank.org/curated/en/2012/11/17058502/nigeria-sustainable-management-mineral-resources-project> >.

World Bank 2012b, *Sustainable Management of Mineral Resources: Abstract*, World Bank, viewed 6/02/2014, <<http://www.worldbank.org/projects/P086716/sustainable-management-mineral-resources?lang=en&tab=overview>>.



World Bank 2013, *Artisanal and Small-Scale Mining: Brief*, The World Bank Group, viewed 04/02/2014, <<http://www.worldbank.org/en/topic/extractiveindustries/brief/artisanal-and-small-scale-mining>>.

Yager, T 2012, *The Minerals Industry of Madagascar*. In *US Geological Survey Minerals Yearbook*, <<http://minerals.usgs.gov/minerals/pubs/country/2011/myb3-2011-ma.pdf>>.

Yakovleva, N 2007, 'Perspectives on female participation in artisanal and small-scale mining: A case study of Birim North District of Ghana', *Resources Policy*, vol. 32, no. 1–2, pp. 29-41.

Zolnikov, TR 2012, 'Limitations in small artisanal gold mining addressed by educational components paired with alternative mining methods', *Science of the Total Environment*, vol. 419, pp. 1-6.