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Sustainable Development

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Introduction

The aim of MMSD's research on artisanal and small-scale mining (ASM) is to develop an understanding of how the ASM sector can better contribute to sustainable development. The work is based on several components:

- A Global Report on ASM, which is a baseline assessment of the importance and nature of this activity compiled by Projekt-Consult GmbH;
- Studies commissioned by MMSD from countries where the ASM sector represents an important source of livelihoods: Bolivia, Brazil, Burkina Faso, China, Ecuador, Ghana, India, Indonesia, Malawi, Mali, Mozambique, Papua New Guinea, Peru, South Africa, Tanzania, The Philippines, Zambia, and Zimbabwe.
- A participatory researchers' workshop held November 19-20 in London.

The workshop brought together approximately 40 participants, including the researchers who compiled the various reports. Representatives from non-governmental and community-based organisations, small-scale miners, academia, government, and international organisations attended, as well as small scale miners

The specific objectives of the workshop were to:

- Discuss lessons learned from initiatives designed to improve the contribution of the sector to sustainable development (for example through improving environmental performance or improving access to credit). This included identifying good practice through case study presentations and discussion/analysis of key factors that help the sector contribute to sustainable development.
- Discuss the findings from the global, regional and country reports on ASM.
- Identify regional priorities and experiences that need to be reflected in the global report on ASM.
- Consider how the outputs (global, regional and country studies, databases, network of researchers) of the MMSD ASM research activities can be best used. Particular consideration was given to how these can feed into the Collaborative Group on Artisanal and Small-scale Mining (CASM).
- Provide an opportunity for researchers on ASM from different countries to meet and exchange experiences.

Key Recommendations

Several key recommendations were developed at the workshop.

- The ASM sector should be recognised as a vital economic force, a source of rural livelihoods and a potential vehicle for sustainable development.
- The need for donors to pay increasing attention to the ASM sector. Specifically:
 - Governments need to place ASM on the agendas of the UN and other donors such as the OECD;

- Donors should ensure that ASM is included in Rural Development Frameworks: ASM misses out on donor funding, partly because of problems in accurately describing and classifying it.
- Donor projects need to have as their ultimate goal community self reliance, whether this be through mining itself, or mining for the development of other sectors. They need to:
 - Identify and build on the assets of mining communities;
 - Provide training, particularly for miners to develop entrepreneurial approaches (a transferable skill);
 - Provide access to information and networks.
- The role of women is a key consideration for community projects. They should include awareness raising of the role of women and be considered separately from child labour issues.
- The Collaborative Group on Artisanal and Small-scale Mining (CASM) needs to be related to other sectors within the World Bank and other institutions; It would be a good idea to change the image of CASM by adding the word 'community' in the title.
- A multi-disciplinary network needs to be built to address the issues of ASM at national and international levels;
- The SADC Women in Mining Trust should be extended to other parts of Africa
- Information gaps should be addressed – in country studies and in countries where serious information gaps exist such as China and Russia.

Workshop Discussions

Key points and recommendations made in the general discussions and break-out groups during the workshop are summarised below.

The development of socially and economically sustainable communities

Investment of revenues

Merely increasing revenues for miners will not necessarily help the ASM sector better contribute to sustainable development. Developing capacity in the re-investment of revenues at the community level, is key to ensuring long-term benefits.

Investment of revenues at the local level implies first capturing them. Those people who really profit from ASM need to be identified. In many cases, there are very few (normally those involved in marketing and leasing of equipment).

Reinvestment schemes include:

- Investment in the mining activity;
- Investment in economic diversification;
- Improving local institutions (infrastructure, training).

Re-investing in mining activity is not always the most productive way to maximise the sector's contribution to sustainable development. Diversification by the local community was seen as a key re-investment strategy. Such projects involve agriculture, aquaculture, cottage industries, etc., need to be at the grassroots level and participatory from the outset.

The case study of the Sadiola area in Mali provided a good example of one such project, where a development fund was set up, and a livelihoods approach used to determine how the fund should be spent. Although this focused on mining activities in the first instance, it gradually shifted to other economic activities. The role of women had a key role to play in this transition, as they tended to be very active in non-mining activities.

Rush situations and migratory miners

A community needs to be stable for sustainable development to come about. Migratory communities can make the transition, though few examples have been identified. Women occupy a prominent role in helping to facilitate this transition.

Regional development by advancing economic opportunities for sedentary communities was identified as a key component in preventing rush situations. There are examples of strong ASM-based communities applying pressure to miners they wish to deter from working in their area. Communities near mining sites can also exert an influence on miners to promote better environmental practices and to ensure that ASM activity contributes to community development.

Skills development and training

Workshop participants identified skills development and training as a key factor for improving the sector's contribution to sustainable development. These were judged to be more important than technical improvements, particularly when the skills are transferable to other disciplines. Most important are entrepreneurial, information sharing, environmental management, and production-related skills.

Training or capacity building enables communities to understand how benefits from ASM can be equitably distributed. Training can also help make ASM miners more aware of the benefits the sector brings, and help make the sector more open and transparent. Training is also needed to raise awareness of the importance of women in managing ASM.

Retaining and adding value

Each commodity has its own characteristics. Programmes can be designed to add value to ASM at each stage of the activity (mining/production; processing/transformation; marketing). If markets for ASM projects can be secured, such 'vertical integration' can be a stabilising force. Obstacles to securing markets include difficulties relating to access, quality assurance/branding, import substitution and by-products. Many products have a great deal of fair trade potential, but there is currently a need for some kind of quality assurance for fair trade. Miners are not necessarily the best people to engage in the integration of activities along the minerals value chain.

External assistance

The type of assistance is determined by the cultural context. The sector needs to move from one that is unorganised, informal, with little access to capital, no/low technology and limited contacts, to one that is organised, formal, that has access to capital, transferable skills and expertise, and is linked to a network of contacts. Such tools and expertise can be provided by governments, NGOs and donors in assistance projects, with the aim of using and building upon local capacity. Donor assistance projects need to ensure that the returns to ASM miners are greater than the costs.

Credit schemes

Given that the requirements are so high and lending agencies unwilling to lower them due to the high risks involved, credit schemes are difficult to implement. Similarly, rotating funds have not worked very well because there are too many defaults on loans. No clear solutions to this problem were identified, and this is an area where more work needs to be done.

Governments

In a sector that is still illegal in many countries, governments are rarely seen as partners, but as a source of repression. Even in countries where ASM is legalised, there is often a lack of institutional backup to implement government policy. Many workshop participants considered that decentralisation was a key element for success. The security of land access for indigenous people is an important part of the legalisation of ASM.

Large mines

The responsibilities of large mines towards ASM miners needs to be recognised. ASM miners are often used as 'free geologists' by large companies. In many cases workers laid off from large mines will become ASM miners. Many positive examples are emerging; large companies can assist ASM communities through development schemes, including organisational, marketing, or technical assistance and training. Case studies were provided of company involvement in Sadiola and Ozizweni as donors and equity partners. Attention needs to be paid to the impacts of mine closure on ASM communities, particularly in the case of cottage industries for which the mining company is a market.

NGOs and academic institutions

Local and international NGOs often have experience in community development and capacity building that can be essential for donor assistance projects to work. Academic institutions are of pivotal importance, not just in providing research on ASM, but also for training geologists and engineers needed for the sector.

Information Gaps

There is still a great lack of knowledge on the nature and importance of ASM around the world. Basic statistics on the number of miners, health and safety, and the environmental situation are difficult to measure. Serious information gaps were identified in China and Russia, where hardly anyone is involved in analysing the ASM sector.

Networks

Is external assistance always necessary? There are examples of communities that move towards sustainable development without external assistance (for example when profits from ASM are used by parents to educate their children). Networks can be an excellent vehicle for learning from good practice in other regions, or even from other sectors. Some issues can be addressed through regional networks, e.g. river pollution, migration of ASM miners; or smuggling. International networks can be created, particularly through the Internet (although access to information for ASM miners through the internet is currently low).

CASM

The World Bank's CASM initiative has been created to increase networking and exchange of information and good practice between ASM stakeholders. It is designed to serve an important coordination role between ASM assistance projects and donor funding. CASM feels it would be in a position to continue the ASM work initiated as part of MMSD.

Workshop Proceedings

Keynote address: The importance of the ASM sector

Namakau Kaingu, Regional Chair, Women in Mining Trust

The SSM sector contributes to economies. While governments resist its existence, it has the attention of international organisations and donor agencies. Attention needs to be given to all stages of the mining operation, from exploration to closure. With reference to the Global Report, it is interesting to see how researchers view the sector, but this research needs to lead to action. Small-scale miners need assistance from professionals. While the sector is historically male-dominated, the labour force is sustained by women who might also engage in other economic activities. Only a small percentage of reports mention the contribution of women. The MMSD project is a great opportunity to ensure that our views are included.

Discussion on the Global ASM report

Led by Thomas Hentschel, Projekt Consult – MEDMIN and Felix Hruschka, Proyecto GAMA SDC – MEM – Projekt Consult

It was agreed that the report was well presented. The following points were made:

- While distinctions need to be drawn between LSM, ASM and SSM, the report should move beyond definitions to making recommendations and focusing on constituencies.
- The case studies should focus less on the short term, and more on mining and sustainable development.
- The report should focus less on the negative impacts of ASM and more on the positive contribution to the economy.
- More emphasis needs to be made on cultural issues. For example, in Australia kaolin is used for ceramics and also for ceremonial practices; these two uses need to be acknowledged. In PNG there are about 80 different language groups, all of which need to be taken into account. In some places only women are miners, in other places only men.
- The issue of community development is key. The report needs to emphasise the need for greater access to skills development; to technology and to information. Related to this is the need to support AIDS orphans who, finding themselves in the position of heading households, turn to ASM as a source of livelihood.
- The report needs to be more policy-orientated, with a clear distinction between what can be done at different levels (e.g. regional and national).
- There is a need for greater emphasis on the macroeconomic issues e.g. export regimes which demand that countries send everything out.
- The need for a legal framework should be highlighted, e.g. the legal definition of an accident.

- The issue of governance needs to be highlighted. Where ASM is concerned, there are either too many lines of government, or too few (particularly at global and local levels). While the regional platform for Africa has five lines, the European platform has none. Better governance is needed to help communities to become empowered and form partnerships with other stakeholders.
- There is a need for greater emphasis on actual studies and records to provide objective data. For example, even though safety standards are poor, records show that mining fatalities are lower than traffic fatalities in an area of Calcutta. The difficulty of obtaining real statistics was acknowledged, however. One participant described the situation in China where there are at least 6-7 million small-scale miners (about half the world population of small-scale miners). However, there are very few hard facts. Another participant raised the issue of artisanal mining in Russia, which has far-reaching environmental consequences. In Mongolia people are even mining mercury! It was agreed that there is a need for NGOs to turn their attention to the situation, that funding is needed to update information, and that MMSD could contribute by highlighting this at the international level.
- There needs to be more focus on SADC; much of the report relates to Latin America. It was, however, pointed out that much of the currently available data comes from Latin America as opposed to the SADC region.
- The report should consider the issue of closure, which is fraught with problems, e.g. communities are sometimes built in former mining sites; operations are sometimes abandoned because of a lack of resources.

Findings from country studies

- In Indonesia, it was emphasised that improving ASM miners' lifestyles is rooted in community level development. The Mali study also emphasised that ASM must be seen in a framework that incorporates all the community activities at the local level.
- In the study in Ghana, it was found that it is not widely known that ASM is no longer an illegal practice. Many ASM miners wrongly believe that they are involved in an illegal activity, and fear prosecution. Furthermore, many do not understand the value of the minerals they are extracting.
- One of the major findings from the study on Bolivia is that the greatest problems in ASM arise during the exploitation phase rather than during the beneficiation stage.
- The study on Peru highlighted four key issues:
 - Almost all operations are illegal and miners work on land belonging to third parties, paying little attention to long-term consequences;
 - The government is never involved in discussions on ASM;
 - There are many problems associated with both social organisation of the mine, and organisation of the mining product chain. There is a need for examples of good practice from other sectors;
 - More details are needed about beneficiation. For example, the use of mercury is very widespread, and much more work is needed at the technical end about how to change this practice.

- The Zambian study underlined the fact that a legal framework to deal with ASM is still lacking in many countries.
- Experience from the Philippines demonstrates that even though there is a legal framework for ASM in this country, as well as an institution in place to oversee it, its implementation has been curtailed by a lack of resources.
- The issue of mining and indigenous people is very important in South America. In Ecuador ILO 169 has been implemented in terms of securing consent before the start of the operations. Such conventions should be used as vehicles for managing conflict.

Case Studies on assistance projects to the ASM sector from around the world

The Shamva Mining Centre Project

Alex Mugova, ITDG, Zimbabwe

Project outline

Shamva Mining Centre (SMC) was established in 1989 as a joint initiative between the Ministry of Mines of the Government of Zimbabwe, the Intermediate Technology Development Group (ITDG), the Small-scale Miners' Association of Zimbabwe (SSMAZ) and donors, including GTZ, the UK Department for International Development (DFID) and the EU. The objectives of the project were to:

- Provide a commercially viable and sustainable custom milling facility for small-scale gold miners in the Shamva area, and improve incomes of miners;
- To create jobs;
- To train miners in health, safety and sustainable mining methods;
- To share and disseminate lessons and experiences from the project locally and internationally.

As a pilot project, SMC was implemented in two phases to allow for adequate experimentation and learning. During Phase 1 (1989-90), the following were installed: a stamp mill with capacity to process 5 tons of ore per day; a low cost shaking table; an amalgam barrel setting pond and a retorting facility. It was evident from the outset that viability of the milling centre would largely depend on availability of adequate ore for processing. Provision of support to miners to improve their mining methods and productivity was therefore an important component of the project. A portable compressor, jack hammer and water pump were also purchased for hiring out to miners.

Phase 1 indicated high demand for the services of the centre. Consequently, Phase 2 focused on expanding the milling capacity to enable more miners to use the centre for processing their ore. This was achieved through the installation of a ball mill with capacity to process one ton of ore per hour.

At its inception, the centre was expected to serve about 43 miners within a 50 km radius. By 1995 however, the services provided had proved so effective and popular that more than 227 miners were regular users of the centre, and the catchment area had extended from the original 50 km radius to a radius of 200 km.

Since commercial sustainability was one of the key objectives of the project, a commercial company - Shamva Mining Centre Ltd was set up to run the project. A manager and secretary were appointed to manage the company on a day-to-day basis. The manager reported to a board of directors who set company policy and also linked the company to the broad development context of the country. The board consisted of seven members. Four represented small-scale miners and were nominated by the SSMAZ; two were nominated to bring in expertise in finance and legal issues, and one was nominated by ITDG to safeguard the development objectives of the business. The project manager, an experienced mining engineer, was always available to attend board meetings and provide advice when required.

Project achievements

- Annual turnover of the centre steadily increased from about \$50,000 in 1989 to \$1.5 million by 1995.
- At the peak of its operations the centre provided secure and productive employment to 30 people consisting of 16 permanent and 14 casual employees. The cost of creating one job was calculated at \$6,000 as compared to \$100,000 for large mines.
- There was a significant increase in productivity at the mines. At the start of the project in 1989, average production of ore at small mines was 9 tons per day. By 1994 average production had increased to 57 tons of ore per day.
- Training was, and continues to be provided to small-scale miners in mining methods, geology, mine pegging, environmental management, health and safety, business planning and management. This has enabled miners to develop and run their mines more professionally.
- The lessons and experiences of the centre were regularly documented by the project team and widely shared and disseminated. As a result of the interest, the model has been widely replicated in other African countries, including Burkina Faso, Ghana, Mali and Tanzania with support from donors and international agencies like the World Bank. At least three replication projects have been implemented by both NGOs and private entrepreneurs in Zimbabwe.

Key success factors

The SMC project was successful because

- It addressed a real need of small-scale miners through improvement of their access to processing technology and it increased their incomes by as much as 30 per cent.
- There is a ready market for gold, the mineral processed at the centre. The fees paid by miners to have their ore processed are directly related to the final price at which their

gold is bought by the Reserve Bank. Fees are therefore set at a rate that is both affordable to miners and competitive to ensure the centre makes a profit.

- It was made clear to all stakeholders at the inception of the project that attainment of commercial viability was the ultimate goal of the project. Small-scale miners were made aware from the start of the project that they had to pay competitive fees for the services provided by the centre.
- The project was a collaborative initiative including all key stakeholders, viz., small-scale miners, government, ITDG and donors. The government gave its full support to the project because it offered a real solution to the needs of small-scale miners and increased gold deliveries to the Reserve Bank.

Problems encountered

- Problems encountered at SMC reveal the difficulties involved in balancing commercial and development objectives. By the early 1990s, it became evident that the capacity of the ball mill installed at the centre was not adequate to meet the growing needs of miners. As a result, miners had to wait between three to six weeks to have their ore processed.
- In an attempt to address this problem, the SSMAZ executive committee decided that a miner had to bring in at least ten tons to the centre before the ore could be processed. Those bringing less would only have their ore milled during slack periods. This arrangement effectively excluded the very small-scale miner from benefiting from the facility, despite the fact that they were supposed to be the main beneficiaries of the project.
- The biggest problem encountered at SMC were the poor business decisions made by the SSMAZ executive committee concerning the operations of the centre. In January 1999, the committee decided that it had built sufficient capacity to run the centre without external assistance. No experienced and competent manager was appointed to take over from the ITDG manager. By June 1999, the centre had run into serious cash-flow problems. In January 2001 the committee decided to lease the centre to a local miner in Shamva. Since then, the centre has been operating well below capacity and milling services provided are far less efficient than was the case prior to the take over of the centre by SSMAZ.
- Notwithstanding these setbacks, the centre continues to operate and provide a valuable service to small-scale miners. There is no doubt that apart from the management shortcomings experienced, the technical and commercial viability of the model has been demonstrated. Access to improved, efficient and cost-effective processing facilities and mining extension support services by small-scale miners has increased well beyond original expectations.

Lessons learnt

A number of important lessons have emerged from SMC project.

- There is need for development agencies to decide whether it is always necessary to hand over commercial projects to producers' associations such as SSMAZ. Great care has to be taken in working with associations to ensure that a few powerful people in the association do not reap the benefits for their own individual gain.
- Technology unlocks the potential of small-scale miners to run viable mines. Access to processing facilities at SMC enabled miners to increase productivity and improve the viability of their mines until management problems emerged in January 1999.
- Small-scale miners, like any other entrepreneurs, require a complete package of business development services to thrive and grow. In addition to technology, they require skills in business planning and management, mining methods, sustainable environmental management and access to credit and profitable markets.

The Medmin-Cepas credit, and difficulties in its execution

Danilo Bocangel Jerez, MEDMIN Foundation, La Paz, Bolivia

Mining in Bolivia is divided into two main sectors, medium-scale mining and small-scale mining. Within small-scale mining, there are two sub-sectors: small mining companies and mining cooperatives. Both have low profitability due to a lack of corporate criteria and financial resources which would enable them to confront the fluctuations in the international price of minerals. In small mining, around 70 per cent of the material extracted from the mine deposit is wasted due to inadequate technology.

The current position of small-scale mining

Cooperatives have increased in number as a result of the dismantling of state mining (COMIBOL) in 1985. As a result of the fall in metal prices, the great majority of the COMIBOL workers were fired and formed cooperatives, principally in the department of La Paz.

The sector is currently characterised as follows:

- It has involved the transition of state mining to private and cooperative mining, without any type of planning, equipment or technical assistance;
- The role of the state has changed from productive to regulatory;
- Mining has remained the principle export of western Bolivia and one of the major generators of employment due to its multiplying effect;
- ASM is characterised by low technological development;
- ASM in Bolivia is less important in the international market than before, amounting to only 0.5% of world production;
- Only gold, silver and wolfram mining are currently profitable;
- There is an absence of environmental and industrial safety policies;

- ASM contributes little in the way of taxes and royalties.

The MEDMIN Foundation

A programme known as the Integrated Management of the Environment in Small Mining (MEDMIN), financed by the Swiss Agency for Development and Cooperation, was set up in 1994 with the aim of identifying, constructing and introducing technology compatible with the environment, which also helps to increase the production of the company or cooperative. Phases I and II (1994-1998) were criticised on the grounds that it had focused only on mineral dressing and the improvement of the processing plants, while ignoring the fundamental issue of mine exploitation.

In response, MEDMIN has begun to identify measures needed to improve production and the quality of life of the underground miners. Geological, prospecting and feasibility studies have not been taken into account due to their high cost, an aspect that the beneficiaries are aware of.

MEDMIN relies on two important sources of funding: the Lamellas Fund (US\$ 60,000), and a fund of US\$200,000, managed jointly with the Episcopal Commission for Bolivia (CEPAS), which contributes 50 per cent of the total credit.

Difficulties in granting credit

Credit funds originally came from the former National Fund for the Environment (FONAMA). Because of irregularities in FONAMA, MEDMIN withdrew its funds and created a rotating credit fund. The beneficiaries are individuals or legal entities which CEPAS and its approval committee consider qualify as small miners or mining cooperatives. However, a year and a half after the launch of the fund, the qualifying criteria have made access to the fund extremely difficult, particularly for mining cooperatives which are most in need of the credit. Along with the stringent requirements demanded by CEPAS, the following factors also make it extremely difficult for small mining cooperatives to gain access to the credit:

- CEPAS disburses funds gradually in order to get to know the repayment capacity of the beneficiary. This cuts down the number of beneficiaries per year.
- At 17 per cent per annum the interest rates are higher than the majority of loan institutions.
- One of the qualifying requirements is for applicants to secure a guarantor institution (using its own funds) for project follow-up. This is extremely difficult to find, and has resulted in 95 per cent of applicants withdrawing their applications.
- Another requirement is for applicants to provide a mortgage guarantee (a house in La Paz).

Perhaps the most important factor is the high risk of the credit scheme to MEDMIN CEPAS in that CEPAS itself provides 50 per cent of the funds, rather than merely administering the scheme. This is in contrast to APEMIN, the other institution which

provides credit to ASM. Unlike MEDMIN CEPAS, it provides 100 per cent of the funds which are then administered through CEPAS FONCRESOL.

APEMIN (the Programme for the Support of Small Mining) carries out its activities in the COMIBOL Ordure ex-mining centres, providing technical and financial support to small mining operations. The principle impact to date has been to reduce the migration from the depressed areas on the Altiplano to the urban areas and the zones supporting illegal activities in the coca industry. This was achieved by increasing incomes and improving working conditions, thus elevating the standard of living and the economic growth of the area in general.

The following is an analysis of the APEMIN Credits and some comparative figures:

	MEDMIN	APEMIN
Interest rate	17%	17%
Size of fund	US\$ 200,000	US\$ 216,000
Beneficiaries	Small mining and Coops	Small mining and small and small borrowers for activities derived from mining.
Destiny of credits	Technical assistance, Equipment, environment	Working capital
Applications received	34	17
Applications approved	2	14
Credits disbursed	1	13
Maximum assigned	31,500	20,000

According to a CEPAS internal report of September 17 2001, 100 per cent of the credit amounting to US\$215,982.79, comes from APEMIN. The credits are destined exclusively to working capital. Of the 17 credit applications approved by APEMIN, 14 have been approved and 13 have been disbursed.

The APEMIN credit scheme is very different from the MEDMIN/CEPAS scheme. The credits approved and granted by APEMIN through CEPAS FONCRESOL, are well above those of MEDMIN-CEPAS. Furthermore, because the MEDMIN-CEPAS credits have a strong environmental component, there is an increased risk that the funds will be diverted as a result of a lack of environmental conscience on behalf of the miners.

A report dated August 31 2001 shows conclusively that CEPAS was right to demand so many guarantees of the mining sector. In the case of APEMIN, CEPAS approves and grants credits much more easily, because the funds are derived entirely from APEMIN. According

to this report, of the 17 credits disbursed, only four companies and cooperatives have paid off their debts. Eleven are running up interest, and of the more serious cases, there is one in arrears and two with judgements. The most worrying cases are the 'uncollectables'.

Conclusions

Small miners are treated very badly by banks and financial institutions. The government insists that it continues searching for a way to provide true technical assistance for the small miners, especially for exploration and evaluation of mineral deposits. Despite MEDMIN's attempts to contribute to small mining by offering credit, the qualifying criteria makes it very difficult for miners to access these funds. This difficulty has been compounded by the absence of financial protection to cover the possibility that borrowers might default on repayments, by high rates of interest and by the demands for guarantees that cannot be provided.

Because its system of credit has not yielded satisfactory results, MEDMIN is looking into the possibility of using the funds for other purposes. The best alternative continues to be the contribution of environmentally compatible equipment to companies and cooperatives with a certain percentage of counterpart funds on their part.

Milne Bay, PNG

Blasius Susapu, Small-Scale Mining Department, PNG Government

The history of gold-mining in Milne Bay, PNG, began in 1896, when gold was first discovered on Sudest Island. Since then, ex-patriots have mined a number of the islands, and part of the mainland. SSM by nationals on the islands has been continuing on an irregular basis.

A visit to Milne Bay in 2000 by the Department of Mining (DOM) and AusAID identified the lack of infrastructure supporting the purchase of gold at a reasonable price as a key problem. The only gold buyers operating were paying K5-8/gm, which many felt was unacceptable. Consequently few people felt that mining was worthwhile, and as a result of this lack of competition, the price has remained low.

There are also cultural problems. According to certain social norms, it is not acceptable for individuals to rise above the rest, thus deterring would-be miners from mining the major resource of gold on Sudest Island. While there is no such cultural restriction on Normanby Island, many people do not know how to mine alluvial gold.

In most areas in Milne Bay people mine gold on their own land. The only exception is an area near Alotau at Wagawaga where people have been settling on land owned by another group.

In October 2001 Milne Bay was visited by a group consisting of the Department of Mining, MRO, Cunungra gold buyers, Conservation International, Milne Bay Provincial Administration and AusAID. The aim was to make contact with places hitherto not visited,

and to find ways of working with the private sector to develop the economic infrastructure to support the current and prospective alluvial gold miners. MRO had spent some time on Sudest and Normanby Island setting up an office and starting an outreach and educational programme similar to the DOM programme, with the aim of encouraging and supporting those who wanted to take up mining.

On Misima Island a gold mine had been operating since 1989 and is now entering the closure phase. The mine closure plan includes assistance to the community to cope with the change in economic conditions. Agriculture has been the main line of pursuit, despite its isolated location, distance from markets and limited agricultural land. Small-scale mining, however, has the potential to replace a major part of the royalties paid out each year (which average 1.7 million Kina). This would be spread across the community of Milne Bay and not restricted to the traditional landowners where the mines are located.

The visit to Milne Bay and, in particular, Misima Island revealed some of the aspects of the SSM practice that can be improved upon both in terms of gold recovery and environmental and health issues.

Most of the small-scale miners on Misima (no accurate figure is available at this point, but an estimate would be between 30 and 50), are using pans or sluice boxes. In all cases, mats were not used in the boxes, and gold was being lost. By using a mat of any type or an alternative like Kunai grass, coconut husks, towelling, carpet etc, gold recovery would be increased by a factor of about 1.5-2.

A number of miners were engaging in unnecessary and potentially dangerous practices involving the use of mercury to recover gold. For example, panners were observed pouring mercury into the sluice box, in the belief that this was what they had to do to recover the gold. This meant that all sizes of gold were covered with mercury including small nuggets. They were then delivered to the gold buyer in this amalgamated condition, which, though hazardous from a health point of view, provided an opportunity for the group to demonstrate the 'tin fish tin' method of mercury recovery and explain the health hazards from the smoke during the burning of the amalgam.

The price paid by the gold buyer of K15/gm was accepted as reasonable, and a considerable increase on previous amounts paid out by the other buyers. The word soon spread, and a number of people came to sell their gold.

Talks were held with the business development arm of Misima Mines on these issues, and ways of accelerating development of SSM in Misima itself and the other islands of the area, and of making it more sustainable.

Sustainability of SSM in Milne Bay can be reinforced by the cooperation of all stakeholders. In this case Misima Mines is now committed to supporting the programme initiated by DOM with in-kind donations of transport, both local and from Port Moresby, as well as accommodation. The private sector is committed to supporting skills development by making available simple mining equipment, and by developing the economic infrastructure by buying the gold produced at a fair price at the local level. The environmental issues have to be continually addressed (stream pollution and mercury contamination), if the mining

population is to increase. An additional issue is the training of health staff to recognise and treat any mercury poisoning that may occur, and to keep people informed of the dangers.

Comments following the presentation

One participant pointed out the importance of sharing experience between countries. PNG has no history of miners' associations, but this might be a useful alternative for the future.

Another participant raised the question of whether it would be preferable for miners in PNG to use retorts for gold collection as they do in China. In response it was pointed out that the use of tins in PNG, where tinned fish is consumed in vast quantities, was a culturally relevant and sensible approach, bearing in mind the prohibitive cost of manufactured retorts.

The question was asked whether mercury was reusable once used in gold recovery. Mercury can be reused indefinitely. The biggest problem is to raise awareness of the dangers of using mercury and teach miners how to recycle it. SSM in PNG is currently at a very early stage of development, and at present for every gram of gold recovered, 4-5 tonnes of mercury is released into the environment.

The contribution of the Sadiola gold mining project to poverty reduction and the development of local mining communities

Seydou Keita, National Coordinator of PAMPE (Promotion de l'Artisanat Minier et Protection de l'Environnement), Mali

Background

Knowledge of artisanal mining practices has been present in the Sadiola region for centuries. In fact, archaeological studies and socio-cultural research carried out on certain sites has shown that artisanal mining goes back to the Middle Ages, with some archaeological finds dating back to the 13th Century. While mining activity diminished around the 1970s, it started to increase again from the 1980s onwards. The arrival of the Anglo Gold Mining Company and the mining of the Sadiola Gold Mine were the main factors influencing the spectacular revival of artisanal mining in this region.

The project's beginnings

The Sadiola Gold-Mining Project was implemented by the Sadiola Gold-Mining Company following the establishment of an industrial mine by the South African Anglo-American Group.

The development and expansion of the Anglo Gold Company Mining Project resulted in the displacement of the villages of Sadiola and Farabakouta, and their re-establishment on new sites. One of the results of this involuntary move was the loss of gold-mining sites and the temporary cessation of this activity in the region. To limit the negative consequences of mine expansion on the development of the gold-mining communities, a support project was put in place to ensure the promotion of artisanal mining and the development of sustainable,

revenue-generating activities. Starting in 1998, this support project was the first of its kind in Mali to be implemented by the Anglo Gold Mining Company in favour of artisanal miners. Situated approximately 250 km from Bamako in the western part of Mali, the region covered by the project includes the villages of Sadiola, Farabakouta, Medina, and Neteko and includes a gold-mining population of about 500.

Diagnostic analysis of the artisanal mining sector

The main aim of the Sadiola Gold-Mining Project was to ensure the development of local mining communities through technical and financial assistance. It was built on a diagnostic analysis of the strengths and weaknesses of the sector. Actual examination of the state of artisanal mining in Sadiola as well as elsewhere in Mali showed that this sector is faced with a series of limitations and weaknesses, including:

- Inappropriateness of legal, legislative, and regulatory instruments;
- The absence of technical support structure and lack of reliable statistics;
- A failure to recognise the links between gold-mining and poverty;
- Failure to take into account the complementary nature of artisanal mining and other endogenous development activities;
- Inadequate capabilities characterised by technical and material insufficiencies;
- The difficulty of accessing assistance and credit;
- The lack of integration of aspects related to health, hygiene, and environment;
- Obstacles to the improvement of the status of women;
- Limitations linked to the marketing of products.

A more in-depth analysis has shown that the artisanal mining sector also has some strong points that should be reinforced. Some examples are as follows:

- The socio-cultural importance of artisanal mining;
- The custom-based organisation of traditional gold-mining;
- The cohesion of socio-economic groups;
- The impact of income on a familial, local, and communal level;
- The number of people involved in the sector;
- The existence of ore with potential for mining on a small-scale;
- Recognised agricultural potential and availability of other economic options;
- The emergence of micro-financing schemes and NGOs on a local level.

The objectives of the project

Having identified the strengths and weaknesses of the artisanal mining sector through this detailed diagnostic study, the Sadiola Gold-Mining Project was then built around three strategic objectives:

1. The resolution of the limitations and weaknesses of artisanal mining;

2. The reinforcement of its strong points and improvement in performance;
3. The establishment of revenue-generating activities and the improvement of the conditions of the mining communities.

Based on these strategic objectives, the Project then set the following specific goals:

- To improve the living conditions of gold-miners through the promotion and development of sustainable, revenue-generating activities, complementary to mining;
- To encourage a progressive shift of artisanal mining into the formal structure of production;
- To reinforce the organisation of gold-mining groups and to favour the creation of small, local mining companies;
- To improve artisanal mining through the extension of simple and appropriate technological means;
- To manage the mining of resources in such a way as to rehabilitate degraded sites and to preserve the health and hygiene of the gold-miners.

Implementation of the project

The Sadiola Gold-Mining Project was implemented in several stages:

The preparatory stage:

- Public consultation with traditional groups in order to identify, survey, and record target groups;
- The grouping together of gold-miners and the creation of the Sadiola Mining Cooperative;
- The establishment of 500 gold-mining cards for the members of the cooperative;
- Consultation with the different socio-economic groups in order to identify revenue-generating activities (market gardening, grain banks, community stores, fish breeding, tree planting, poultry farming, and bee keeping);
- Working together with local NGOs to identify potential partners;
- Geological studies and an assessment of the mining potential of Farabakouta (reserves of 1.5 tons with a grade 0.93 g/ton and 1.86 g/m³);
- Identification and testing of mining equipment (Ezipanner, crushers, motor pump);
- The creation and building up of a communal development fund;
- The elaboration and adoption of the programme of operational activities.

The operational stage:

This was comprised of the following activities:

- Technical assistance was provided to the gold-miners by the geologists of the Anglo Gold Company on the following aspects:
 - mining and extraction techniques;

- mining techniques for alluvial gold;
- operation and maintenance of Ezipanner equipment for the treatment and washing of ore;
- security measures for miners and underground mining activity;
- rehabilitation techniques for mined sites (sealing of mine-shafts and planting of fruit trees).
- Socio-economic group capacities were reinforced by:
 - assistance in the creation and organisation of a communal development fund with a monthly budget of approximately US\$ 60 000;
 - initiation to the reinvestment of profits, and to communal organisation and management;
 - initiation to women's activities such as market gardening, and the fabrication of dyes and soaps;
 - improvement of mined sites through fruit tree planting and conversion into ponds for fish breeding;
 - organisation and management of grain banks and communal stores;
 - financial support to small projects such as bakeries, rural restaurants, woodwork shops, jewellers, and metalwork shops;
 - support for the construction and organisation of a communal market;
 - construction and organisation of a rural school and a learning centre for adults;
 - support for the construction and running of a communal health centre.

Positive changes brought about by the project

Some examples of the positive changes brought about by the Sadiola Gold-Mining Project:

- Organisational and management capacity building for efficient resource extraction (group of 500 miners);
- Development of revenue-generating activities that complement artisanal mining;
- The emergence of local entrepreneurship and stimulation of private initiatives;
- The improvement of purchasing power in local communities;
- A decrease in subsistence-related activities and growth of a local monetary economy;
- The reinforcement of local sanitation practices and education;
- A reduction in dependence of local communities on sub-soil resources;
- An improvement in the living conditions of gold-miners.

Conclusion

The Sadiola Gold-Mining Project demonstrates that, in order to encourage the sustainable development of this sector, it is necessary to build technical capacity and encourage greater productivity and security, while minimising the negative impacts on the environment. The artisanal mining sector needs to be approached in a more global manner that takes into

account all socio-economic systems in order for it to become an instrument for development in the fight against poverty.

The artisanal mining sector served as an economic anchor point for stimulating the development of complementary, sustainable, revenue-generating activities. The income generated has enabled small businesses to be established, which are well integrated into the local economic structure, and which contribute significantly to the sustainable development of the Sadiola region.

Group discussion on Sadiola

Transferability of skills

One participant asked whether the skills developed by gold-miners were transferable to other sectors. Particular reference was made to gold washers. In response it was explained that the project aimed to provide access to the men, women and children involved in other activities such as agriculture. Gold washing is a cultural activity in the region, which is likely to continue. With regard to sustainability, it is not easy to detach gold washers from their principal activity, but there is evidence of success. Micro-credit schemes have strengthened the role of women through these projects.

Child labour

The age of children involved in gold-mining activities ranges from 5-8 years, and is the subject of an investigation being carried out by ILO. These children are not paid, and their work is seen as a learning experience for which they do not expect any remuneration. Caution should be exercised when attempting to break this association, as this is part of the usual upbringing of the children.

The Ozizweni project in Kwa Zulu Natal, South Africa

Grant Mitchell, MEPC

In 1996 a massive, illegal mining operation was discovered by the DME (Department for Minerals and Energy) at Ozizweni, Kwa Zulu Natal. The mine had been in operation for over 25 years and was involved in the mining of clay and coal. Bricks were made using simple kilns fired by the mined coal. While the bricks were sub-standard in terms of SABS approval, they were used to build dwellings in the area. Each miner rented an 'allotment' and worked as an independent contractor selling bricks to the local community.

It has been estimated that some 200,000 bricks are sold per month, and that the operation as a whole employs in the region of 400 people. In 1998 the DME assisted the project by registering the Blaaubosch Trust with a total of 110 beneficiaries and a board of 15 trustees.

The manufacturing process

The operation was labour intensive with little technology (pick and shovel and wheelbarrows), and studies by the Council for Geosciences revealed that the kilns were not yielding optimum performance due to poor design. There were also poor economies of scale - larger kilns would be more effective.

Working conditions and practices

The area is an environmental disaster – mining occurs within the precincts of the village and a number of houses have collapsed. There have been a number of fatalities chiefly by hangings collapsing and burying people alive.

Child labour is deployed on an informal basis, and because labour is casual, there is no legislative framework governing working practices (e.g. Basic conditions of employment).

Involvement of NSC (National Steering Committee)

Once the trust had been established it signed an agreement with the NSC to develop a business plan. The NSC was government funded to about R10,000 per annum. DME negotiated an alternative site with Anglo American, and each of the service providers was tasked with different aspects of the business plan.

Development of a business plan

This went through the following stages:

- A marketing plan was commissioned;
- Geosciences assessed the ore body;
- Miningtek started on the mine plan;
- MEPC developed the human resources requirements;
- DME negotiated the permits and EIA requirements;
- The marketing study indicated that the demand for all types of bricks in an 11 km radius from Newcastle was 55 million units in 1999, and at the time was expected to increase to 66 million units by 2001;
- Demand was met by the major producer Corobrick, who had to supplement the area's supply by importing from Gauteng;
- Results of the business plan continued to come in;
- Geosciences tests revealed that the clay was of suitable quality to produce high quality bricks;
- Mintek developed a kiln design suitable for firing at the requisite temperatures;
- Miningtek designed a mine process that would be labour-intensive based on low technology;
- MEPC developed the organisational structure.

Towards a new working model

Miningtek called a meeting and revealed that the labour-intensive method would not be cost effective and meet demand. They proposed a low technology model to increase output to 3 million bricks per annum. This would require capital to the tune of R1 million and skills development. A competent person was sought to run the plant and to assist in skills transfer, but no such person could be found in the area. The trustees also found it difficult to meet any of the financial requirements for matching finance. At this point it was decided that a consultant should be appointed to take the process forward.

The consultant finalised the business plan and presented it to the IDC (a large financing corporation) for funding. The IDC agreed, provided an equity partner could be sought. Subsequently, several potential partners were interviewed, and a decision taken. An investment company was appointed.

The consultant also approached Corobrick as a potential equity partner, and they agreed, provided that they could do their own feasibility study. This was completed in June 2001. Corobrick agreed to buy bricks at R380 per thousand, and the production rate was estimated at 19 million bricks per annum. Using the same system as in their own factories, albeit more labour-intensive, Corobrick agreed to buy all the bricks on condition the required standards were met. Key management personnel were provided to oversee the process.

Financial structure of Blaaubosch mining

- Total capital requirement: R5.2 million;
- Corobrick 25% company shareholding;
- Rexile 25% shareholding;
- NSC 22% shareholding;
- IDC 28% shareholding;
- Therefore 50% loan, 50% equity.

Lessons learnt

The concept of appropriate technology needs to be applied with caution;

If a commodity feeds into a larger market it needs to conform to requisite demands;

Joint venture partners need to be identified early on in the process;

Service providers need to define their levels of involvement early.

Group discussion

- *What kind of arguments were used to persuade the community of the need to balance technology demands and the use of labour?*

A number of jobs that would normally have been handled by technology have included a manual component, so that high technology and low technology are being used hand in hand. The company was prepared to make this compromise, and will observe proper training processes, including on-site management monitoring.

- *Are the miners equipped to manage the company?*

The fact that the brick industry had started to develop 20 years before the establishment of the project, demonstrates the entrepreneurial ability of the community.

- *What are the prospects of the long-term sustainability of the project?*

While the miners had been working at subsistence level for many years, they are now in a situation where the brick market is healthy, and therefore do not face any immediate danger. However, the miners are at the mercy of external fluctuations.

- *Are the bricks suitable for kilns in the use of disposal of medical waste? If so, there would be a large market in areas where there is a large incidence of AIDS and meningitis.*

The bricks are used for construction purposes, and the project was aimed to produce bricks for the South African market. However, this suggestion is worth considering for the regional market.

The Role of CASM – the Collaborative Group on Artisanal and Small-scale Mining

Jeffrey Davidson, the World Bank Mining Department

CASM evolved as a result of a number of discussions over the course of several years, during which time the mission of the group changed quite considerably. The mission finally agreed upon is:

To attempt to reduce poverty by supporting comprehensive livelihoods approaches, including ASM.

The *modus operandi* is coordination and networking, exchanging information and practice; and working with donors to identify key criteria for funding.

Priorities

- Creating an inventory of good practice;
- Running a database of contacts;
- Reviewing donor priorities;
- Reviewing key problem areas.

Organisational structure

- Sponsoring group – with responsibilities for strategic direction;
- Expert advisory group – with responsibilities for quality control;
- Secretariat, based at the World Bank – with responsibilities for the mandate and day to day running of the Group.

The Group has a charter, a work plan and a budget of \$200,000 per year.

Activities

Website – www.casmsite.org

This has been set up, and contains the charter, the work plan and important dates. A feature page highlighting an interesting story such as a summary of an active project, is changed on a regular basis. There is also a revolving regional web page where each region is able to report its news every three months.

The website is designed to provide a forum for the exchange of good practice stories, and suggestions. There is a need to move towards an interactive website, which can be used as a tool.

Database

The database in production will contain the following:

- Contacts: all information accumulated through MMSD and CASM's own networks;
- Technical Assistance Project Database
- Bibliography recording projects reported.

All will have full search capabilities. It is hoped that a legal database will be added in the future.

The network will only be successful if it is maintained and active at the local level. CASM is prepared to finance people to provide updates on ASM activities in local areas.

Small grants programme

CASM will start with a small grants programme amounting at first to US\$4,000-5,000. This might be used in the following areas:

- Research;
- Training (in the field or more centrally);
- Publications – getting the news into the field; newsletter translated into local languages; local radio programme. Not for large consultants, but for people interested in working at a small-scale.

CASM feel they would be in a position to take over from MMSD.

Closing Discussion

A group discussion followed, summed up by ten key points from the chair:

1. CASM needs to build on regional solidarity;
2. CASM could signal some important messages on its website as this is set up. It is important that the website shows how integrated it is with the community;
3. The Experts Group in CASM is very positive. It needs strong leadership and diversity;
4. The 'Collaborative' could be changed to 'Community', thus: 'Community Development around Artisanal Mining'. This would put the stress on community development, and incorporate mining into the equation.
5. CASM should grant licences for projects it showcases;
6. We should talk about community development around ASM with the OECD, with whom we have an audience;
7. MMSD is an existing network, and will ensure that its contacts are up to date. There needs to be less emphasis on 'net' and more on 'work'. Everyone must do his/her best to stay involved;

8. It is important that cross-linkages between large and small are addressed. If they are shedding labour, it is going to ASM. If companies are to help reduce poverty, they have to link themselves to ASM.
9. MMSD needs to know what the UN system is doing in order to build on existing initiatives;
10. We must ensure that there is a good record of this meeting, and that good examples are recorded.

Annex I. Agenda

Monday 19th November

9.00 Coffee and registration

9:30 Welcome

Welcome by Richard Sandbrook, MMSD Project Coordinator and workshop chair. Richard will describe how the ASM research and workshop feeds into the overall MMSD project.

9:40 Update on MMSD ASM work

Brief review of MMSD research on artisanal and small-scale mining and discussion of workshop objectives.

9:50 Introduction

Researchers and other participants introduce one another

10:30 Refreshments

11:00 Keynote address

Namakau Kaingu, small-scale miner, will discuss the importance of the ASM sector.

11:10 The Global ASM Report

Thomas Hentschel and Felix Hruschka will lead the discussion on the draft global ASM report focusing on general content, regional perspectives and report findings.

12:00 Learning from the country studies

General discussion on what was learned through the research and what were the difficulties identified by the researchers. Discussion of the critical issues facing the ASM sector.

13:00 Lunch

14:00 Case studies from around the world

Several of the MMSD researchers will present case studies on how ASM issues have been addressed in their respective countries, analysing success and problem factors. Each presentation will be followed by a discussion period.

Speakers:

- The Shamva Mining Centre in Zimbabwe by Alex Mugova, ITDG
- Credit Schemes for ASM miners in Bolivia by Danilo Bocangel, MEDMIN
- Milne Bay Province in PNG by Blasius Susapu, Department of Mining, Papua New Guinea Government

15:30 *Refreshments*

16:00 **Case studies from around the world** (*continued*)

Speakers:

The Sadiola ASM poverty reduction and community development project in Mali by Dr. Seydou Keita, PAMPE (Promotion de l'Artisanat Minier)

The Ozizweni Project in Kwa Zulu Natal, South Africa by Grant Mitchel, MEPC (Minerals and Energy Policy Centre)

17:30 *End of Day*

19:00 *Welcome Drinks*

19:30 *Dinner*

Tuesday 20th November

9:30 **Introduction to break out groups**

The specific design of the breakout sessions will be finalised at the workshop. The groups will be focus on several broad themes; the short and long term viability of the ASM sector in the context of sustainable development, the effectiveness of assistance projects to the sector, the relationship between large and small-scale mining, and the role of donor agencies.

9:45 **Break out groups**

Three or four break out groups will be formed; each group will have an appointed chair that will report back to the plenary.

10:45 *Refreshments*

11:15 **Feedback from break out groups**

Each group will discuss the key elements and findings from the break out groups.

12:30 *Lunch*

13:30 **The role of CASM – the Collaborative Group on Artisanal and Small-Scale Mining**

Jeffrey Davidson will discuss the role of CASM.

14:30 *Refreshments*

15:00 **Next Steps**

A general discussion on what the next steps are in the short and long term for the ASM sector to better contribute to sustainable development.

16:30 **Closure**

Annex 2. List of Participants

Attendee	Organisation	Country
Danilo Bocangel	MEDMIN	Bolivia
Edmund Bugnosen	Bugnosen Minerals Engineering	UK
S.L Chakravorty	NISM	India
Victor Chipofya	University of Malawi	Malawi
Geoff Crispin	PNG Advisory Support Facility	PNG
Jeffrey Davidson	The World Bank Mining Department	USA
Bernd Dreschler	ITDG – Southern Africa	Zimbabwe
Peter Eggleston	Rio Tinto plc	UK
Joseph Eyison	Deputy Director of the Small-Scale Mining Project	Ghana
Anne-Marie Fleury	MMSD	UK
Gabriela Flores-Zavala	MMSD	UK
Jose Gellego-Lapeña	European Commission	Belgium
Giles Geiger	P.T. Kalimantan Surya Kencana	Indonesia
Djibril Guéy	Groupement Général d'Entreprise	Burkina Faso
Aaron James Gunson	University of British Columbia	Canada
Thomas Hentschel	Projekt Consult – MEDMIN	Bolivia
Gavin Hilson	Imperial College	UK
Marie Hoadley	MMSD Southern Africa	South Africa
Felix Hruschka	Proyecto GAMA SDC – MEM - Projekt Consult	Peru
Namakau Kaingu	SADC Women in Mining Trust	Zambia
Seydou Keita	PAMPE	Mali
Crispin Kinabo	University of Dar es Salaam	Tanzania
Juana Kuramoto	GRADE	Peru
Beatrice Labonne	UN/DESA	Switzerland
Deirdre Lewis	CSA Group Ltd	Ireland
Greg Love	Field Engagement, Energy & Mining Programme, Centre for Environmental Leadership in Business Conservation Intl.	USA
Yao Maglo	AJDS	Togo
M. Masialeti	University of Zambia	Zambia
Grant Mitchell	MEPC	South Africa
Salvador Mondlane	University of Zimbabwe	Zimbabwe
John Monhemius	Royal School of Mines, Imperial College	UK
S. Montoedi	NUM	South Africa
Sachlan North	Susila Dharma International	UK
Richard Sandbrook	MMSD	UK
Fabián Sandoval	Fundación Ambiente y Sociedad Fundación Futuro	Ecuador
Jose Sena do Nascimento	Centro de Tecnologia Mineral – CETME	Brazil
Peter Smith	DFID	UK
Andrea Steel	MMSD	UK
Blasius Susapu	Small-scale Mining Department, PNG Govt.	PNG
Richard Svotwa	University of Zimbabwe	Zimbabwe
Humbulani Tshikalange	NUM	South Africa
Nestor Vargas	Cotapata Gold Cooperative	Bolivia
Marcello Veiga	Dept of Mining and Mineral Process Engineering, University of British Columbia	Canada
Elisabeth Wood	MMSD	UK
Hermann Wotruba	RWTH, Aachen	Germany

Acronyms

AJDS	Association des Jeunes pour le Développement Social
CASM	Collaborative Group on Artisanal and Small-scale Mining
CETME	Centro de Tecnología Mineral
DESA	Department for Economic and Social Affairs
DFID	Department of International Development
GRADE	Peruvian research institution with experience in the area of natural resources and environment, particularly in mining
ICEM	International Federation of Chemical, Energy, Mine and General Workers' Unions
ITDG	Intermediate Technology Development Group
MEDMIN	Medio Ambiente, Minería e Industria
MEPC	Minerals and Energy Policy Centre
MMSD	Mining, Minerals Sustainable Development
NISM	National Institute of Small Mines
NUM	National Union of Mineworkers
PAMPE	Promotion de l'Artisanat Minier et Protection de l'Environnement
PNG	Papua New Guinea
RWTH	Institute of Technology of the State of Nordrhein-Westfalen in the new Federal Republic of Germany
SADC	South African Development Community
UN	United Nations
WB	World Bank
WBCSD	World Business Council for Sustainable Development