

Enhancing the contribution of mining to sustainable development

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Abstract: This paper reviews recent developments aimed at improving the mining sector's contribution to sustainable development. Mineral endowments are regarded by many development and environmental non-governmental organizations (NGOs), as a 'curse' and counterproductive to long-term growth and poverty reduction goals, even antithetical to sustainable development in developing countries. This paper argues that, in spite of some empirical evidence in some countries, this is not an inevitable general rule and that the mining sector offers numerous possibilities for catalysing sustainable development and attainment of the millennium development goals. This is, however, conditional upon adequate governance and social and environmental safeguards being in place. The heterogeneity of the mining sector is considered and concern is expressed for the undermanagement of the growing, albeit not new, phenomenon of artisanal and small-scale mining in developing countries. Without better management of this sector any attempts to improve the contribution of mining to sustainable development will be severely limited.

How can the extractives industries (normally taken to refer to mining, oil and gas, but in this paper limited to the former) be sustainable? The very nature of the term *extractive* implies that this sector exists by exploiting and depleting non-renewable, finite, natural resources. The sustainability of extractive industries is, therefore, a difficult message to market and relatively new concepts such as 'sustainable mining' or 'sustainable minerals', which are attempts to do so, are considered by many as no more than illusory contradictions in terms.

The prevailing perception in many quarters is that there is little that is 'sustainable' about extractive industries, even if we accept the long time horizons that geologists adopt to convince sceptics that minerals are renewable resources, that is, resources that, on human time-scales, are essentially inexhaustible when managed correctly.

Non-renewable resources exist in a fixed quantity in the Earth's crust and thus, theoretically, can be completely depleted. On a time-scale of millions to billions of years, geological processes can renew such resources. However, on human time-scales, they can be depleted quicker than they are formed, although some non-renewable resources can nonetheless be recycled and reused (Miller 2000). (Figs 1–3).

The only way for extractive industries to have a seat at the sustainable development 'table' is through broadening our understanding of the

nature of not only the concept of sustainability, but also the dimensions of *capital*. We need to look beyond traditional definitions of capital that are limited to the financial and tangible factors of production – investment and equipment – to four different types of capital: human, financial, manufactured, and natural capital. The latter are usually described as comprising resources, living systems and ecosystem services (Hawken *et al.* 1996). We can, however, usefully qualify the definition of natural capital by subdividing the concept into two to illustrate two dimensions of resources, renewable and non-renewable, and thereby accommodate mining in sustainability discussions.

The legitimacy for the extractive industries to be a party to the sustainable development agenda is achieved when the sector is seen to be using the first three forms of capital to transform non-renewable, natural capital, not only into the material benefits that fulfil society's need for goods and services, but also into more sustainable opportunities and livelihoods for society (Fig. 5).

In some countries, the longevity of mining operations has spanned many centuries. For example, Sri Lanka's gemstone mining is reputed to have lasted two-and-half thousand years thus far. The key to the success of the role of minerals in sustainable development, however, is in the utilization of this resource as a platform for achieving economic



Fig. 1. Fulfilling the goods and services demanded by society: off-shore diamond dredging, west coast of South Africa (photo: Hobbs).

diversification, growth and broad development goals, while maintaining social stability and protecting environmental integrity.

While a number of developed countries (USA, Canada, Sweden, Finland and Australia, among others) and a few developing countries (Botswana and Chile; Hope 2003) have achieved considerable economic success through reliance on minerals in their development processes, we also find regions with extensive histories of mineral exploitation where the direct benefits to those regions have been less obvious (Figs 6–8).

The mineral wealth of Cornwall in the United Kingdom, for example, has been exploited since Phoenician times, reaching its peak at the turn of the 19th–20th centuries. One would have expected this mineral wealth to make the county an enduring region of prosperity, ahead of those without such mineral resource endowments. Instead, it was recorded during the death throws



Fig. 2. Fulfilling the goods and services demanded by society: Mozal, aluminium smelter, Mozambique (photo: Hobbs).



Fig. 3. Fulfilling the goods and services demanded by society: coal mining, Witbank, South Africa (photo: Hobbs).

of the tin and copper mining era to be the county with the most extensive land dereliction in the UK, its only merit being, in some places at least, its industrial archaeology value. (At its worst period, UK Government figures for 1966 showed that Cornwall was the county with the highest degree of dereliction; Barr 1970.)

In spite of centuries of prosperous mining activity, Cornwall is now officially classified as one of the poorest regions in Europe and is a recipient of European Union development assistance, much of which has been used to clean up the physical legacy of past tin, copper, and kaolin mining. No wonder then that it has been selected as the home for a new Post Mining Alliance Initiative, working in partnership with the Eden Project, which has created an educational and tourist resource in a disused china clay quarry.

Momentum for change

Up to 20 years or so ago, the only reference material available in Schools of Mines or university engineering departments that could be considered as, in any obvious way, linking mining with sustainable development were those addressing the technicalities of tailings design and management and rehabilitation of disturbed and derelict post-mining lands.



Fig. 4. Fulfilling the goods and services demanded by society: phosphate mining, Morocco (photo: Hobbs).

The mining industry has lagged behind other 'primary' industries, notably chemicals and oil and gas, in their understanding of, and commitment to, the broader concept of sustainable development. Sustainable development was taken as being synonymous with environmental management and was characterized by resignation to acceptance that a mining operation was a 'necessary evil', restricted in locational options and only amenable to mitigation and amelioration of its impacts, not actively seeking out the positive development opportunities it created.

This was noticeable at the Earth Summit (UN World Conference on Environment and

Development) held in Rio de Janeiro in 1992, where the chemical industry took 'centre stage' with their *Responsible Care*® initiative. The (then) Business Council for Sustainable



Fig. 5. Diamond mining, Orapa, Botswana (photo: De Souza).



Fig. 6. Cornwall's mining legacy. The Red River draining into to St. Ives Bay, Cornwall; 'Red' because it conveys tailings from the Tolvadon valley, the scene of centuries of tin and copper mining and milling (photo: Hobbs).



Fig. 7. Cornwall's mining legacy. Derelict tin mine workings near Redruth, Cornwall (photo: Hobbs).

Development (now World Business Council for Sustainable Development; WBCSD), which led business leaders' participation in the Earth Summit, had only one chairman of a company with mining as its core business among its 48 members, Rio Doce International of Brazil.

The seminal publication presented by WBCSD's business leaders to the Earth Summit, *Changing Course – A global business perspective on development and the environment* (Schmidheiny 1992), included only one, three-page case study on the mining sector's contribution to sustainable development, ALCOA's 'Sustainable mining in the Jarrah Forest, Australia', which predictably focused on land rehabilitation issues. The supportive regional reports similarly only included one mining case study from Africa, rehabilitation of limestone quarries at Bamburi Portland Cement, Kenya (Haller & Baer 1994).



Fig. 8. Cornwall's mining legacy. Wheal Coates engine house, now a National Trust property, near St. Agnes, Cornwall (photo: Hobbs).



Fig. 9. East African limestone quarrying, a rehabilitation challenge, Twiga Portland Cement, near Dar es Salaam, Tanzania (photo: Hobbs).

Other sectors had been galvanized into action beyond minimum regulatory compliance by a series of environmental, social, safety, financial and public relations disasters and adversarial campaigns by an increasingly activist civil society. These included:

- the Bhopal (Union Carbide) disaster that killed 5100 and seriously injured 200 000 in India;
- the incipient impact of pesticides on raptors through food chains (notably dichlorodiphenyltrichloroethane; DDT);
- the realization of the contribution of chloro-fluorocarbons (CFCs) to stratospheric ozone depletion;
- the 1989 Exxon Valdez oil spill in Prince William Sound;
- Shell's experiences over the Brent Spar oil rig disposal; and
- community conflicts in the oil-rich Niger delta.

All serve as prominent examples along with growing concerns about climate change.

This was not to say that the mining sector was inactive nor that there was any shortage of conflicts, antagonistic campaigns, environmental and safety disasters or communication breakdowns that confronted the mining industry:

- protracted difficulties in gaining access to new mineral resources were common, such as those faced in the late 1980s and early 1990s by Richards Bay Minerals when trying to extend mining of heavy mineral bearing sands (ilmenite, rutile and zircon) further into the coastal dunes of St. Lucia in South Africa;
- the Romanian Baia Mare cyanide spill in 2000 entered the Danube and adversely impacted four countries;
- community conflicts and cessationist civil war were attributed to Bougainville copper resources exploitation in Papua New Guinea.

These and others contributed to mounting pressures and incentives for change.

Regular media headlines exposed the need for a greater responsiveness to society's concerns by the mining sector. Accepting physical environmental damage as an inevitable consequence of mining, it was also inevitable that the interpretation of sustainability in the sector was centred on legacy issues and rehabilitation. This was an important but far from sufficient response (Fig. 9).

A considerable momentum for change built up, resulting in the sector having the highest profile of all industrial sectors at the 2002 World Summit on Sustainable Development (WSSD) in Johannesburg (Figs 10 & 11).

Broadening the concept of sustainable development

The response in the 1990s had been to improve planning and operational environmental management through better environmental assessment and auditing, pollution prevention and control, and the development of integrated environmental management systems. International agencies developed environmental guidelines for the mining operations (the Berlin Guidelines 1991, revised 1999). The Australian Environmental Protection Agency's 'Best Practice Environmental Management in Mining' (1995, updated 2002) advisory and training modules and the various technical report publications of the United Nations Environment Programme (UNEP) (see www.mineralsresourcesforum.org) serve as good examples of the initiatives that guided a greater responsiveness in the industry in the post-Rio and pre-Johannesburg climate of change.

These responses demonstrated the truism that environmental management supported, rather than acted as a constrain to good business management. They were driven by the practical realization that good environmental management



Fig. 10. Broadening the concept of sustainable development, mining often requires sensitive relocation: coal mining for power generation, Majuba coal mine, South Africa (photo: Eskom).

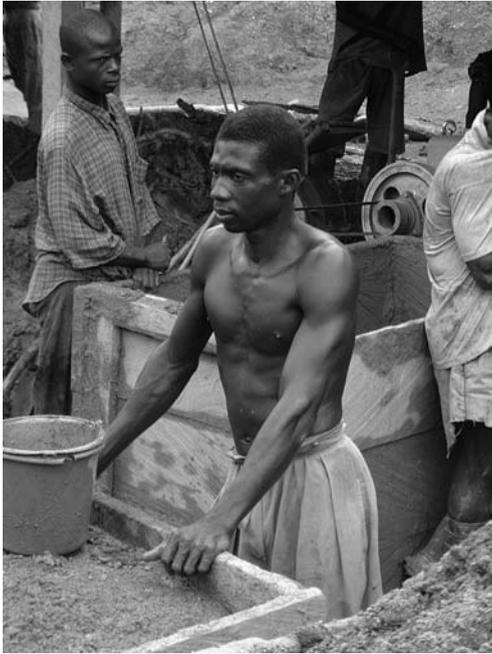


Fig. 11. Broadening concerns of mining to development opportunities, small-scale gold mining, Ghana (photo: Hobbs).

reduces liabilities, cuts costs, improves efficiency and quality, and, for the more insightful companies, was increasingly interpreted as identifying new business opportunities.

Clearly, however, the gains were still preoccupied with the environmental dimensions of sustainable development and largely limited to core business issues within physical operational confines. The social dimension was one where the benefits were less obvious to the mining companies, other than serving some nebulous concept of 'social licence to operate' and easing permitting and regulatory processes.

Slowly there was a recognition that sustainable development is as much about the external socio-economic environment of the company (social justice, community relations and good governance and the interplay between these) than, generally, site-specific, environmental issues.

Public relations professionals started to populate embryonic sustainable development units within mining companies, frequently separate from the more technically oriented environmental divisions, which maintained an engineering profile. Their programmes geared to the sociocratic rather than technocratic goals. Glossy corporate sustainability reports emerged that were as important in changing internal

organizational mindsets in the process of their formulation as in communicating to external stakeholders a company's commitment to sustainable development.

Important initiatives emerged that reflected a more comprehensive approach to sustainable development within the sector. This was illustrated in the agenda of the International Council on Mining and the Environment (ICME), World Bank, UNEP and United Nations Commission on Trade and Development (UNCTAD) hosted Conference on 'Development, Environment and Mining' in Washington, DC (1994), a conference that addressed the contribution that the sector could make to international sustainable development.

Another initiative launched in 1998 was the Business Partners for Development (BPD) (Natural Resource Clusters) programme hosted by the World Bank. This was styled as 'a new way to manage social issues in the extractive industries' and gave particular attention to developing models of 'tri sector partnering' between private, public and civil society sectors based on the practical experiences of specific natural resource operations. The BPD pioneered a trend to move the sector towards participation in 'partnerships' and 'multistakeholder processes' and encouraged the industry to move from an enclave mentality to one in which it could meaningfully address sustainable development issues in partnerships through more effective social investment, engagement in community affairs, establishing new communications links and networks, and so on.

The BPD started to address the difficult grey boundaries where the moral and legal responsibilities of a mining company's role in community development end and the role of government takes over. Through case studies such as the Las Cristinas gold mine project in Venezuela and the Sarshatali coal mine in India, the BPD attempted to explore ways of enhancing the sustainability of development through focusing on poverty mitigation, growing human capital, community participation, environmental benefits, increased social cohesion, and improving access to basic services (www.bpdweb.org).

Business takes the lead

Further significant progress resulted, when the WBCSD added sector-specific action to the previously generic agenda of business advocacy that it had pursued (as the BCSD) at the Earth Summit in 1992. Following success in focussing attention on sustainable development issues in the paper and pulp sector, it moved into other

realms of business where there was a need for a significant change, including the mining sector. Consequently, some mining companies joined the growing organization.

The WBCSD's resultant Global Mining Initiative (1999) was endorsed by 25 mining company CEOs and later transformed into the, two year 'Mining, Minerals and Sustainable Development' (MMSD) initiative. This was the most comprehensive analysis the sector had ever been subject to regarding sustainable development performance. A framework was developed to guide its role in the sustainable development agenda (IIED 2002).

The MMSD report led to adoption of a Toronto declaration (2002) – a commitment from multinational companies to improve performance towards sustainability – and created a reorganized mining industry association, the International Council on Mining and Metals (ICMM), mandated to develop a work programme to implement the Toronto Declaration and MMSD recommendations. The ICMM Sustainable Development Framework Principles (2003) (Table 1) followed, adding the mining sector's interpretation to the many voluntary principles developed by other business associations during the previous decade.

The MMSD report, as input to the 2002 Johannesburg WSSD, ensured that the sector now had a high profile on the sustainability agenda. This was evident in the Johannesburg Plan of

Implementation (JPOI), the internationally agreed action plan adopted at the United Nations World SSD, 2002. Clause 46 of 170 clauses noted that: 'mining, minerals and metals are important to the economic and social development of many countries. Enhancing the contribution of mining, minerals and metals to sustainable development includes ... supporting efforts to address the environmental, economic, health and social impacts and benefits of mining ... enhance the participation of stakeholders ... and foster sustainable mining practices ... through support to developing countries' (UN 2003).

As bland as these statements are, they should not be underestimated for the fact that they represented recognition at the highest level of the international development community that mining has a role to play in a sustainable world. This is still not a view shared by everyone. Nonetheless, the mining sector had moved into a new era and on to a new agenda. Progress against the statements made at Johannesburg will be critically reviewed at the UN Commission for Sustainable Development (CSD) in 2009–2010, when the sector becomes the focus of the Council for Sustainable Development's work programme of tracking JPOI implementation.

Table 1. *The 10 point ICMM principles*

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- Implement and maintain ethical business practices and sound systems of corporate governance
 - Integrate sustainable development considerations within the corporate decision – making process
 - Uphold fundamental human rights and respect cultures, customs and values in dealings with employees and others who are affected by our activities
 - Implement risk management strategies based on valid data and sound science
 - Seek continual improvement of our health and safety performance
 - Seek continual improvement of our environmental performance
 - Contribute to the conservation of biodiversity and integrated approaches to land use planning
 - Facilitate and encourage responsible product design, use, recycling and disposal of products
 - Contribute to the social, economic and institutional development of the communities in which we operate
 - Implement effective and transparent engagement, communication and independently verified reporting arrangements with our stakeholders
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The Extractives Industries Review (EIR)

Arguably the most significant initiative, however, has been the Extractives Industries Review (EIR) (2004), set in motion in 2000 by the then World Bank President, James Wolfensohn. The EIR was commissioned to investigate whether or not the World Bank's investments in the extractives sector (in this case oil, gas and mining) supported, or detracted from, the Bank's mission of poverty reduction and sustainable development. A three-year international stakeholder consultation process, the independent EIR, together with simultaneous internal reviews within the Bank followed (Liebenthal *et al.* 2003).

The EIR eventually concluded that the sector can indeed contribute to the World Bank's mission and that there was a continuing role for the Bank's investments in the sector. The EIR, however, added the rider that this mission could only be achieved if certain enabling conditions were in place. These conditions are:

- good public and corporate governance;
- greater respect for human rights; and
- more effective social and environmental safeguards.

Good governance can generally be taken to include accountable governments, rule of law, absence of armed conflict or the risk of it, respect for human rights and labour standards, protection of indigenous people's rights and the rights of minorities, government capacity to promote sustainable development through economic diversification, and so on.

They further suggested the need to encourage some specific building blocks of good governance: (Extractive Industries Review 2004)

- promote disclosure of project documents;
- develop the capacity to manage fluctuating revenues;
- develop the capacity to manage revenues responsibly;
- help governments to put in place effective and efficient policy and regulatory frameworks;
- integrate stakeholders in decision making; and
- promote the transparency of revenues flows.

The need for good governance: 'the resource curse'

The EIR had been a consequence of, and added to the debate on, a recurring theme in discussions on the role of the mining sector in sustainable development. This is that intuitively one would expect that the prudent exploitation of mineral wealth should be the basis for economic growth, poverty reduction, political stability, and sustainable development. Paradoxically, however, some resource-rich countries remain amongst the poorest and have the highest levels of conflict, poverty and corruption. Of the world's most mineral-dependent states, 11 are heavily indebted and five have ongoing civil wars. This correlation gives rise to the hypothesis that mineral wealth can be more of a 'curse' than a 'blessing'.

"War, poverty, climate change, greed, corruption and ongoing violations of human rights – all of these scourges are all too often linked to the oil and mining industries". *Nobel Laureates for Peace (Jody Williams, Archbishop Desmond Tutu, Rigoberta Mench Tum, Sir Joseph Rotbalt, Betty Williams and Mairead Maguire)*

The extractives industries are simultaneously an opportunity and a threat to the development prospects of poorer countries. Extractive industries are important in over 50 developing countries. Mineral resource exploitation represents the potential for many of these

developing countries to embark on a more urgent path of economic growth.

Yet it is undeniable that the track record of some resource-rich countries has not been good, and there is no shortage of examples where minerals-derived revenues have fuelled conflicts, corruption, and undermined poverty reduction and sustainable development progress (Goreaux 2001; Montague 2002).

The challenge is to recognize the possibility of the resource curse and work to counter it. The issue of good governance has increasingly framed discussions of the extractive industries and sustainable development. One key element of good governance is transparency, particularly relating to the management of revenues from extractive industries.

The Extractives Industries Transparency Initiative (EITI)

Transparency, applied to revenue flows, enables citizens to hold governments to account for the fate of those revenues received from the exploitation of natural resources. Citizens have the right to know the fate of the revenues government receives from mineral exploitation.

The Extractive Industries Transparency Initiative (EITI) was another outcome of the WSSD (2002). Launched by British Prime Minister Blair, the EITI reinforced the good governance commitments made by G8 leaders (The Action Plan on Fighting Corruption and Improving Transparency, Evian G8 meeting, 2003 with Transparency Compacts being agreed with four countries at the follow-up meeting at Sea Island, USA, in 2004) and African leaders in the New Partnership for African Development (NEPAD). Wiseman Nkhulu – Chairman, Steering Committee of the NEPAD has announced the intention to explore the EITI contribution to the African Peer Review Mechanism).

Transparency is, however, a means to an end, not an end in itself. It is a necessary, but not sufficient, contribution to managing any potential resource curse. The EITI starts from the premise that extractives industries can benefit a country, if managed properly, and that there is nothing inherently wrong with the sector.

At the core of the EITI is the view that if industry pays its taxes and royalties, then government should use these to provide services, rather than have business shoulder the responsibility for aspects of community development that would normally be considered a government's responsibility.

Following the WSSD, a ministerial conference, again addressed by the British Prime Minister, was held at Lancaster House, London, in 2003. This resulted in the widespread public endorsement of a set of voluntary principles and actions (available on the EITI website, www.dfid.gov.uk) by over 60 participants. Reinforcement and a check on progress in implementing the principles followed at a London conference in March 2005. A number of countries have now moved beyond endorsement and are pioneering the practical implementation of revenue transparency; including Azerbaijan, Ghana, Nigeria (launched personally by President Obasanjo in February 2004), Republic of Congo, Sao Tome e Principe, Timor Leste, Trinidad and Tobago, and Kyrgyz Republic. A Trust Fund and reporting guidelines, and so on, have been prepared to facilitate this process, overseen by a multi-stakeholder steering group (DFID 2005).

Implementation requires all extractives industry companies operating in a particular country to annually, or more often, disclose their payments to government, the government to publish the revenues it receives, the credibility of the data to be verified by independent audit, and civil society to use the disclosed data to hold governments to account for the distribution of those funds in the interests of sustainable development.

Sector specific sustainability reporting

The Global Reporting Initiative (GRI) has developed more general sustainability reporting guidelines for companies in the sector – an exercise that is now routine for large companies.

The Kimberley process

The EITI aims to track payments and receipts and, alongside other efforts to improve public financial management, help build accountability. This differs from another significant initiative, the Kimberley process, which is about tracking a commodity, the origin of diamonds in the market.

The Kimberley process is an initiative in which governments, industry and NGOs joined together to stem the flow of so-called ‘blood or conflict diamonds’, rough diamonds that have been used to finance conflicts and that have been mostly obtained illegally (Goreaux 2001).

The Kimberley process certification scheme is a voluntary system that requires participants to certify that their shipments of rough diamonds are free from conflict diamonds. It accounts for about 98% of the trade in rough diamonds.

Common interest in improving governance

The benefits of increased transparency are diverse. Governments will benefit from maintaining or increasing inward investment, communities will receive a greater share of the revenues, citizens will be better able to hold governments to account, companies will benefit from more predictable and stable business and investment climates and consumers’ will be assured of the origins of their purchases.

There are obvious advantages in tackling the issue of poor governance for an industry that is anchored to the place where the resource it needs to exploit physically occurs and that has limited options to relocate to other countries where better governance prevails.

Improving governance also has importance to the development community. This is because of the changing nature of the way in which international assistance is increasingly being delivered. The development landscape of the past is littered with numerous defunct projects set up by a plethora of, sometimes competing, international agencies, often with their own interests a greater motivation than those of the developing countries that they were supposed to assist. As this project-specific aid sometimes by-passed governments, it is little wonder it frequently proved to be anything but sustainable, rarely surviving long beyond the departure of the ‘expatriate experts’ sent in to set them up.

Instead, aid is now increasingly being provided more strategically, as direct budget or sector support. This has the advantages of greater prospects of country ownership, reduced transaction costs, and greater prospects for harmonizing development agencies’ activities and aligning them with the developing country’s own priorities not those of the aid agencies (Table 2) (Holmon 2003).

For this change to be successful, however, there need to be effective and accountable governments, transparency, and widely agreed goals with targets and strategies to achieve them.

Table 2. *The Millennium Development Goals 2000*

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- (1) Eradicate extreme *poverty* and hunger
 - (2) Achieve universal primary *education*
 - (3) Promote *gender equality* and empower women
 - (4) Reduce *child mortality*
 - (5) Improve *maternal health*
 - (6) Combat *HIV/AIDS*, malaria and other diseases
 - (7) Ensure *environmental sustainability*
 - (8) Develop a global *partnership for development*
-

The above goals are supported by 18 targets.

Heterogeneity of the mining sector: artisanal and small-scale mining

By far the greatest amount of attention to sustainability in mining has fallen on the activities of large-scale mining companies. The mining sector is, however, a heterogeneous entity, ranging from large-scale multinationals, through small-scale enterprises, to the artisanal miners who characteristically are labour-intensive operators using rudimentary tools (Figs 12, 13).

It is estimated that there are now more people directly employed in artisanal and small-scale mining than in larger scale formal mining. Yet the complexity of the artisanal and small-scale mining (ASM) sector is leading to its undermanagement, if not active persecution. Government policies on ASM either do not exist or are poorly developed. The lack of formalization of laws, regulations, rights, fair market prices and safeguards fails to capitalize on the contribution the sector can make to development processes.

Artisanal mining has been described as the “most primitive type of mining characterized by groups and individuals exploiting deposits – usually illegally – with the simplest equipment”. The Toronto declaration (2002) recognized that “artisanal and small scale mining . . . are important and complex (*but*) beyond the capacity of ICMM to resolve. Governments and (called on)



Fig. 12. Small-scale emerald mining, Ndola, Zambia (photo: D’Souza).



Fig. 13. Small-scale gold mining, Ghana (photo: Hobbs).

international agencies (to) assume the lead role in addressing them” (authors italics).

The EIR, in response to the high profile given to this sector at its international consultative workshops, commented on the potential of the artisanal and small-scale mining sectors to ‘lessen(ing) the burden of poverty.’ It urged the World Bank to help governments to develop policies that also recognize the sector as heterogeneous (in its own right) and to distinguish between community-based and itinerant miners, giving the former clear priority over mining rights.

Artisanal mining is not a new phenomenon. The labours of artisanal miners have laid the foundations for, and their products have adorned, most early civilizations from Angkor Wat to Zimbabwe. The proceeds of artisanal mining opened up early trade relations.

The history of mining itself is rooted in artisanal and small-scale operations and it has frequently been artisanal miners that have pointed the way to mineral deposits for more capital intensive exploitation. For example, the pre-European settler gold mining and ore processing evident in the Francistown/Tati area of Botswana supported the Zimbabwe/Mapungubwe civilizations and opened trade for these civilizations with the Portuguese and Arabs. It was these primitive workings, dating back to AD 900 (Tlou & Campbell 1984) that led early European settlers to deposits that, with increasing mechanization, supported the first European gold mining ventures in southern Africa in the late 1860s, the remnants of which are still evident south east of

Francistown in Botswana (Van Waarden 1999) (Figs 14–16).

Today, the ASM phenomenon is widespread and growing throughout Asia, Latin America, and Africa, it features in about 30 countries and, according to ILO estimates, provides livelihoods for 100 million people, although there are obvious difficulties in establishing reliable figures. The ILO also estimates that up to 13 million people are directly engaged in the sector (Figs 17–21).

Some of the unacceptable practices found in the historical roots of mining are still found in today's artisanal sectors. These should have been consigned to the annals of social history and industrial archaeology. The sector has an influence on all of the Millennium Development Goals (Table 2) and other issues at the heart of development policy: HIV-AIDS, child labour, poverty, gender discrimination, environmental sustainability and so on (Figs 17–22).

It is estimated that the artisanal mines of the Lake Victoria goldfields, which engage some 300 000 people, produce nearly 70% of the gold production of Kenya, Uganda and Tanzania. In Mozambique. Women comprise 50% of those involved across Africa. It is estimated that gold and gemstones worth US\$1 billion per year are produced in sub-Saharan Africa through artisanal mining (D'Souza pers. comm.).



Fig. 14. Cornish stamp mill; remnants of earliest European gold mining activity in Southern Africa, Vermaak's mine, Botswana (photo: Hobbs).



Fig. 15. Pre-European gold milling 'dolly' holes and grinding surfaces in dolerite at Tati, Botswana, from where gold was supplied to the Zimbabwe and Mapangubwe civilizations in present, day Zimbabwe and South Africa.

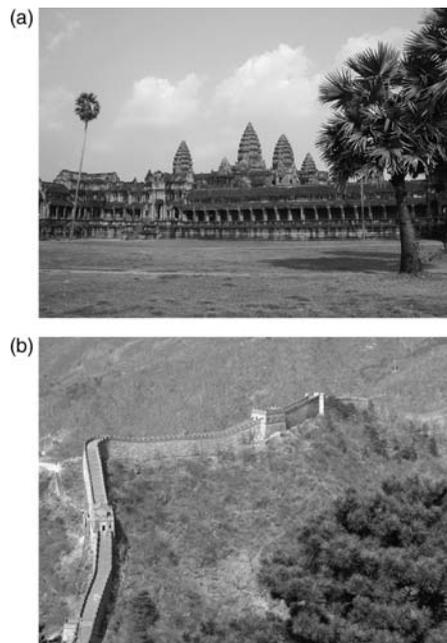


Fig. 16. Artisanal mining provided the materials for many of the enduring legacies of past civilizations: (a) Angkor Wat, Cambodia (photo: Hobbs); (b) the Great Wall of China (photo: Hobbs).



Fig. 17. Artisanal mining and the development agenda. Child labour in Ghana gold mining (photo: Hobbs).

The priority need is to integrate the sector into national economies to ensure these miners have access to official markets and get a fair return for their labours and products. Clearly, social, health, safety and environmental safeguards are few and far between in the majority of these activities (Hobbs *et al.* 2003).

To address these issues, the Communities and Small-scale Mining (CASM, www.casmsite.org) initiative was inaugurated at a meeting in London in 2001 under the auspices of the UK's Department for International Development and the



Fig. 18. Artisanal mining and the development agenda. Health and safety issues: artisanal mining, Gold Ghana (photo: Hobbs).



Fig. 19. Artisanal mining and the development agenda. Women in artisanal mining in Rex, Ghana (photo: D'Souza).

World Bank. CASM is now a thriving international network of experts, government and development officials, private sector, NGOs and artisanal miners themselves.



Fig. 20. Artisanal mining and the development agenda. Hazardous child labour in Mgusu, Tanzania, hand mixing gold and mercury (photo: D'Souza).



Fig. 21. Artisanal mining and the development agenda. Child labour in Ghana (photo: BGS).

Mirroring large-scale operations, CASM's mission is to move enclave artisanal mining communities to more sustainable, integrated communities pursuing sustainable livelihoods. This calls for a transformation of the sector



Fig. 22. Getting the ASM product to market, transporting artisanally mixed copper oxide, Laputo, Democratic Republic of the Congo (photo: d'Souza).

from the current situation – characterized by self-serving opportunism, violence and conflict, dysfunctional social systems (prostitution and few community institutions), erratic incomes and little or no savings – to communities in which land and other rights are respected, community structures exist, reinvestment takes place, safety, health and environmental management systems are in place, and diverse employment and livelihoods opportunities exist (van der Veen 2003) (Figs 23 and 24).



Fig. 23. Irresponsible legacy of recent small scale mining activity, in the footsteps of earlier generations, small-scale discards, Tati Farm, Botswana (photo: Hobbs).



Fig. 24. Irresponsible legacy of abandoned small scale mining activity, hazardous gold mine, exposed shaft, Tati Farm, Botswana (photo: Hobbs).

Conclusion

It is clear that governments, especially developing countries, are often now the weakest link in the momentum behind the drive to 'sustainable mining' that has been led by the private sector. This gulf has become wider as the private sector has devoted considerable attention to improving its contribution to sustainable development.

The role of developing countries is the creation of more conducive business environments and investment climates and the better management of natural resources, renewable and non-renewable. This will enhance sustained economic growth, political stability, and the contribution the mining sector can make to the attainment of poverty reduction, the other Millennium Development Goals (MDGs) and sustainable development.

This paper has tracked recent progress of the mining sector's progress to greater sustainability, highlighting key initiatives. Two further recent initiatives hold out promise of progress in this area. The first of these is the development of the inter-governmental forum on mining and minerals – formerly the Global Mining Dialogue (a Canadian and South African partnership initiative originating from WSSD but only receiving the required 25 member countries to bring it into effect in 2005), which is attempting to provide the necessary forum to encourage more urgent progress in the way governments manage mineral resource endowments and problematic elements such as the artisanal and small-scale mining sector.

Secondly, and at a regional level, the African Mining Partnership was launched in Cape Town in 2004 (initially chaired by Ghana). Twenty-two Ministers responsible for mining in their countries participated (Angola, Burkina Faso, Chad, Republic of Congo, DRC, Djibouti, Egypt, Ethiopia, Gambia, Ghana, Kenya, Malawi, Mali, Mauritania, Namibia, Nigeria, Senegal, Sierra Leone, South Africa, Sudan, Tanzania, Uganda) and stressed the important part that the extractives sector has to play in poverty reduction.

The overall challenge in encouraging sustainable development in mining is to convert what has been described as the *vicious circle* of extractive investments, historically at times characterized by enclave activities that fail to generate indigenous jobs or local investment, operate under a veil of secrecy, have little or no beneficiation or added value, result in little economic diversification and exhibit little compliance to environmental and social standards and laws, to a *virtuous circle*, where jobs are created, revenues collected and managed competently,

incomes saved and reinvested, there are forward and backward economic linkages, diversification is encouraged and environmental and social impacts managed and where poverty and unsustainability are replaced by prosperity and sustainability, in other words 'sustainable mining'.

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