

## **The environmental and socio-economic impacts of small-scale gold mining in Guyana**

**Clifford, M.**

### **Abstract**

For decades, Guyana has been the location of a vibrant artisanal and small-scale mining (ASM) sector. The environmental and socio-economic aspects of its operations, however, have received sparingly little coverage in the literature; as has the recent rapid expansion of the country's gold and (to a lesser extent) diamond economy. The transformation of Guyanese small-scale mining from a insignificant nomadic activity into a central national industry of thousands has been linked to diminishing economic and livelihood opportunities within the country and to the booming global price of gold, both of which have drawn rising numbers of people into the mineral-rich 'interior'. Despite the relatively 'sophisticated' equipment used and the sizeable capital investments made in Guyanese small-scale mines, as well as the existence of relevant policy and government institutions, issues within the industry are familiar to ASM regions elsewhere; widespread environmental degradation, poor and illegal practice of many kinds, and a lack of institutional capacity to enforce penned legislation. This paper provides an overview of the sector, including its central features, impacts, monitoring and regulation, the ways in which abatement of polluting practice such as mercury contamination has been approached, and likely developments in the future of the industry. The Guyana experience provides insight into a notably different context to those usually described within ASM research, and may be found to offer valuable guidance on the implementation of strategies elsewhere, such as in Ghana and sub-Saharan African nations.

## **1. Introduction**

The earth underlying the interior of Guyana is part of the larger Guiana Shield, an area of Precambrian rock covering some 2 million square kilometres in the Northeast region of South America and encompassing not only Guyana, but French Guiana, Suriname and Northeast Brazil. Sharing ancient continental geological characteristics and consequent mineralogical wealth with the western areas of both Africa and Australia, bauxite, iron, and diamonds<sup>1</sup> are found in addition to gold that occurs in hard rock and alluvial deposits (Roopnarine 2006, Hammond et al 2007).

Guyana has a long and colourful history associated with gold in particular. During the exploration of the 'New World' by European nations during the fifteenth and sixteenth centuries, the area of present-day Guyana was referred to by Sir Walter Raleigh as a possible location of El Dorado<sup>2</sup>, and both the Dutch and English landed and launched expeditions in search of gold. But relatively low returns of the metal during exploration and the inaccessibility of the country's interior dictated that it was relatively ignored in favour of its more lucrative South American neighbours until more recent times (Roopnarine 2006). On an artisanal or small-scale level, the main historical sources describing conditions and practice coincide with a initial period of significant movement into the interior by individuals out of the coastal plantations in the years following the decline of colonial coastal plantation agriculture of rice and sugar at the end of nineteenth century (Colchester 1997). Since this time, there has been a presence in the interior of indigenous (Amerindian) and 'outsider' (people of African and Indian descent) prospecting and mining activity, the latter being known traditionally as pork knockers<sup>3</sup>, a label referring to the barrels of dried pork that historically miners subsisted on for long periods spent in the forests (Thomas 1998, Daly 1975, both cited in Roopnarine 2006).

Bar a late flourish of activity around the turn of the twentieth century that saw then British Guiana produce around 4300 kg of gold in 1893 (which at the time saw it rank as one of the primary gold bearing localities worldwide: Miller et al. 2003), in its more recent history the country has been largely anonymous as a producer of gold on a global extent, with the only

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<sup>1</sup> The production of diamonds is definitively of secondary importance to the extraction of gold, as diamonds found within the country are typically of low quality and value (used mainly for industrial purposes). As a result, gold forms the overriding focus of this paper, with diamonds referred to only occasionally.

<sup>2</sup> The mythical city of gold, now curiously the name of a settlement west of the border in neighbouring Venezuela

<sup>3</sup> 'Pork knocking' is now only used to refer to the most rudimentary end of mining. Very much like the term *galamsey* in Ghana, in the context of increasing regularisation of ASM activities, it carries general connotations of illegality.

production being on the purely artisanal scale by pork knockers. A sizeable change in this dynamic occurred in the 1970s, when a surge of migration from coastal regions into the interior by individuals prospecting for gold occurred. This corresponded with a leap in global gold prices and the increasingly desperate socio-economic conditions of the country under Forbes Burnham's 'Cooperative Socialism', which brought the country to its knees. Marcus Colchester, writing in 1998, summarises the country's unenviable recent social history:

"Guyana, which at independence was heralded as 'the jewel of the Caribbean', with one of the continents highest per capita incomes, is just emerging from three decades of one-party dictatorship. These years of sorrow left the country bankrupt, massively indebted and with a wasted infrastructure...In the 1980s, the Guyanese government reluctantly turned its back on 'Co-operative Socialism' under heavy pressure from the international development agencies to liberalize the economy and carry out structural adjustment. A central part of the World Bank and International Monetary Fund's formula for economic recovery was to promote 'non-traditional exports', gold and timber... [The country] was one of the world's first countries to receive structural adjustment lending from the World Bank and is now hailed as a model of effective reform... with the plantation economy stagnant on the coast, it is the country's interior resources that foreign companies and development agencies have their eyes on" (Colchester 1998:3-4).

The predicted expansion of foreign investment into Guyana's interior certainly taken place; large timber concessions have been granted to foreign companies within the country's extensive forest reserves to reap numerous towering and extremely valuable species like Greenheart, Purpleheart, and Wamara, with over \$52 million worth of forest products exported in 2005 (Guyana Office for Investment 2010a); bauxite, the mining operations for which are or have been owned by companies based in China, Canada, Russia, and America, despite a large decline since the 1980s remains a prominent industry in the country, where various forms of mining account for around 10% of GDP and 40% of exports (Guyana Office for Investment 2010b); investment in large-scale gold mining remained restricted to one site, that of the Omai mine, which provided around 70% of Guyana's gold exports until its closure in 2005 due to reported exhaustion of economical deposits (Roopnarine 2006). The recent surge in global gold prices, however, may facilitate resumption of mining at the site as most costly deposits become economical to exploit (Guyana Office for Investment 2010b).

However, as was the case for many indebted countries cogently advised to pursue similar economic liberalisation based around natural resources by international finance institutions, the courting of large-scale mining activity eased some of Guyana’s financial woes and enabled continued access to donor assistance, but was not a panacea to the state’s depressed condition. Guyana still owed some \$734,478,000 to lenders in 2007, approaching \$1000 of debt per citizen, and 35% of its population are currently estimated to live in poverty (World Bank 2010).

Instead, it has been the medium and small scale gold mining operations scattered across the country which have provided a real economic stimulus to Guyana, growing into its most important economic sector. In the current absence of any large-scale activity, ASM produces all of gold in the country. Small-scale production has been a steadily growing since records began at the end of the 1970s, from 10,592 oz in 1979 to between 24-25 times that amount in 2008, when 260,387 oz were produced (Figure 1). The sector has emerged as Guyana’s economic backbone, surpassing the three traditional mainstays of sugar, rice and bauxite. Gold accounted for 36.7% of export contributions in 2009, more than double the value of second-ranked sugar which has traditionally dominated the economy (Table 1).

**Table 1: Rank, value and contributions of export for Guyana in 2009**

<b>Export Item &amp; Rank</b>	<b>Export Value (US\$)</b>	<b>% Contribution (US\$)</b>
1. Gold	281,678,300	36.7
2. Sugar	119,761,300	15.6
3. Rice	114,120,100	14.9
4. Bauxite	79,519,000	10.4
5. Timber	41,425,000	5.4
9. Diamonds	14,133,200	1.8

**Source: Guyana Bureau of Statistics (2010)**

However, very little outside coverage in terms of literature, research or media has accompanied the rapid growth of the small-scale mining.<sup>4</sup> To comprehensively cover all aspects relating to the sector is beyond the scope of this paper. Instead, a brief and general overview is given of small-scale mining practice, and some of the most central issues within the sector are analysed. Ethnographic information on those involved in the sector, mining practice, its environmental impacts, and the institutions that govern and influence the sector are discussed. The

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<sup>4</sup> Although the national press provides a ongoing and vibrant coverage of all issues relating to the sector in the country, and some excellent and comprehensive reports such as Lowe (2005) have been written as part of NGO or donor work.

<b>Year</b>	<b>Production (oz)</b>
<b>1979</b>	<b>10,592</b>
<b>1980</b>	<b>11,003</b>
<b>1981</b>	<b>19,263</b>
<b>1982</b>	<b>8,655</b>
<b>1983</b>	<b>5,039</b>
<b>1984</b>	<b>11,132</b>
<b>1985</b>	<b>10,328</b>
<b>1986</b>	<b>14,036</b>
<b>1987</b>	<b>21,415</b>
<b>1988</b>	<b>18,803</b>
<b>1989</b>	<b>17,343</b>
<b>1990</b>	<b>38,717</b>
<b>1991</b>	<b>59,296</b>
<b>1992</b>	<b>79,581</b>
<b>1993</b>	<b>87,100</b>
<b>1994</b>	<b>99,095</b>
<b>1995</b>	<b>91,451</b>
<b>1996</b>	<b>110,135</b>
<b>1997</b>	<b>98,051</b>



<b>1998</b>	<b>110,047</b>
<b>1999</b>	<b>110,684</b>
<b>2000</b>	<b>105,289</b>
<b>2001</b>	<b>101,849</b>
<b>2002</b>	<b>117,240</b>
<b>2003</b>	<b>105,747</b>
<b>2004</b>	<b>116,236</b>
<b>2005</b>	<b>116,527</b>
<b>2006</b>	<b>205,970</b>
<b>2007</b>	<b>246,200</b>
<b>2008</b>	<b>260,387</b>
<b>Total</b>	<b>2,453,211</b>

**Source: GGMC Records**

ways in which mercury use and emissions resulting from the sector have been understood and approached is then offered as a useful case study with which to contextualise these aspects. Matters that may be decisive in the future of the country's ASM sector are speculated on before concluding.

## **2. Overview of Current Small-Scale Mining Practice**

### **2.1 Demographics and socio-cultural aspects**

A United Nations report compiled on Guyana's ASM sector over a decade ago put the number of miners in the country at 6,000 to 10,000 (Veiga 1998). Lowe (2005) estimates an updated figure of 10,000 to 12,000 people<sup>5</sup> and also points to the 'economic multiplier effects' of the sector; it's benefits beyond direct employment and contributions to GDP in the form of its stimulating and supporting accompanying businesses revolving around mining. This number, accounting for about 1-2% of the 763,437 population (World Bank 2010), must be an extremely cautious estimate given the scale and growth of the sector in recent times. No figure has ever been suggested for the number of dependents upon the sector, but it might be loosely calculated<sup>6</sup> that this could be up to 100,000 people (12-14% of the population), which would mean that it would easily account for the nation's largest source of employment.

Guyana's small-scale mining demographic is described as being almost exclusively comprised of young men originating from the country's coastal region, which contains around 90% of the national population. Important additions to this include sizeable influxes of Brazilian garimpos<sup>7</sup> from across the porous border between the two states, and members of the Amerindian population on whose traditional lands large amounts of mining takes place (Colchester 1998). To this, one may wish to add immigrants from our other countries, especially the Caribbean community; for example, Saint Lucians, Barbadians, Antiguan, and individuals with Canadian and American dual nationalities (often who have been raised in North America) are all represented, albeit in small numbers. Direct involvement of women and children, which is observed to varying degrees in other country's ASM sectors, is

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<sup>5</sup> Based upon the number of registered dredges –which is the dominant form of mining - at the time, and the average size of dredge team.

<sup>6</sup> Using roughly the same ratio as the much-cited ILO report, which gives 100 million dependent for 11 to 13 directly involved (ILO 1999)

<sup>7</sup> The exact number of which is difficult to estimate as many reside in the country illegally.



completely absent, something which is attributed to cultural machismo attributes of mining in Guyana (Lowe 2005).

The vast majority of miners' working lives are spent in mining camps scattered around the interior, working up to twelve hour shifts everyday for several weeks usually without leaving. These periods of work are dispersed with one or two week breaks. Workers are provided with food and other provisions, and sleep under open-sided tarpaulin tents in rows of hammocks. Some sites feature more permanent wooden buildings made for storage of provisions and equipment, and for 'boss men' to reside in. Towns (which are usually more the size of large villages) in mining regions, such as Mahdia and Port Kaituma, serve predominantly as service/supply centres and transport hubs rather than places of residence for miners. Miners converge on such places, which may be hours or even one or two days travel away, for provisions, to sell gold, to come and go to different parts of the country, for vehicles and machinery to be repaired, and for leisure. However, in locations such as Mahdia, where the richness and location of deposits near the settlement has been conducive to sustained successful mining, numerous miners have taken up permanent residence, constructing homes, raising families and opening parallel businesses.

The circumstances given as to why people enter into the small-scale mining in Guyana display an divergence from the normal 'poverty-driven' context underlying prevalence of the activity in most countries (ILO 1999). Lowe (2005) suggests that:

“Artisanal and small-scale mining [in Guyana] is not a classic rural activity, with all the connotations of how the word is used in donor community literature... Miners in Guyana have a solid basic education or a trade skill. Unlike in several developing countries, subsistence (poverty-driven) mining is not significant in Guyana. Most participants in mining exercise a choice based on their assessment of comparative economic advantages... Likewise, seasonal artisanal mining is not a phenomenon in Guyana. No peasant farmers, for example, head to the interior during the out-of-crop season... Within mining regions, miners are transient, always looking for better opportunities” (p.7, emphasis added).

These assertions are at odds with what has been reported about trends in most other country's small-scale gold mining sectors, especially African contexts (Hentschel et al. 2002, Hilson & Potter 2003); firstly, although there has been movement from towns and cities back into rural

areas to pursue small-scale gold mining, the majority of those involved in most country's sectors are indigenous to rural areas at least and maintain strong links to the land and the traditions of mining (Hilson 2002, Jønsson & Bryceson 2009); secondly, whilst it is clearly the case that there are many full-time artisanal miners, temporary entry into the sector to obtain money to supplement ones agricultural activities, and to pay for things like schooling fees or business ventures is still commonplace in African contexts; thirdly, and most strikingly, it is argued that ASM activity in Guyana is not poverty-driven, whereas poverty is widely regarded as a central driving force for the sector as a whole. Rather, people choose to mine from a variety of options available to them as a pose to being driven to it through desperation.

On appearances alone<sup>8</sup>, entrance into mining does seem to be at least as profitable as 'professional' positions, or at least the occupations available to the bulk of the mining demographic (if the existence of a basic education or trade suggested above is assumed). They are potentially much more so depending on the profitability of individual operations. Standards of living and levels of consumption in mining towns are observably higher than in ASM communities seen in most other locations globally. An individual interviewed in one institution suggested that miners could make around 160,000 Guyanese dollars a month (around £530/C1143), whereas a qualified teacher would earn something in the region of 100,000 Guyanese dollars (around £330/C715). Moreover, whereas qualified and professional positions paid 35% of their income in tax alongside other expenditures such as housing and food, miners as a rule avoid paying tax at all costs and have bed and board at mining camps.

But more information is needed to assess how 'lucrative' in relation to other available occupations and 'optional' involvement in mining is in Guyana. The implicit correlation which is made between education and skills on the one hand, and a greater availability of livelihood choices on the other, is questionable; there is a distinct difference between possessing a skill or education and being able to utilise it. Do individuals really select mining from a range of feasible alternative choices for employment? It is unclear. Research that attempted to assess the viability of potential occupation choices for the mining demographic,

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<sup>8</sup> Given the near impossibility of convincing a miner to tell you their income

and maps the movement of people in and out of the sector depending on life course, economic circumstances, and opportunities would be illuminating in this respect.

## **2.2 Mining practice**

The instantly observable difference between Guyana's small-scale mining sector and many other locations worldwide is the relatively advanced levels of equipment and mechanisation. Although large variations in size and sophistication occur, the general equipment at miners' disposal, and the living standards of miners and within mining communities would suggest an amount comfortably above the near-subsistence levels that characterise the majority of small-scale mining regions. Set-ups that typify many ASM sites, featuring large groups of individuals working a relatively small area of land using minimal mechanisation and large amounts of manpower, breaking down material by hand, and using rudimentary processing techniques, are virtually non-existent, confined to a insignificant number of nomadic, and usually illegal miners who search for gold deep in the bush reminiscent of the pork knockers which founded the sector (such extraction is described below). The exact chain of events that has brought the country's ASM sector to this point is unclear but put in simplistic terms it is probably because such advancement has been; firstly, necessary; and secondly, possible.

It is suggested by Lowe (2005) that as easily accessible deposits have been exhausted<sup>9</sup> more intensive technologies have been essential to access and process deeper and/or lower grade gold than can be reached using more traditional methods. This argument would also partially support the assertion that mining in the country is not poverty-driven, as only ventures with sufficient financial backing could afford to operate, and those individuals reliant upon capital deficient and labour intensive mining find themselves with decreasingly sparse extractable sources of gold.<sup>10</sup> The growing scarcity of gold that can be accessed by pork knocking methods is also something that the author suggests has driven regularisation, which was introduced as early as 1880, and which in turn may have been complementary to more advanced forms of extraction. Pressure for more formal arrangements for prospecting and extraction to avoid disputes and establish ownership built as an increasing number of miners

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<sup>9</sup> Something which is perhaps not surprising considering the length that artisanal operators have been scouring the interior of the country

<sup>10</sup> There is nothing to stop hard-up individuals from entering the sector as labourers, however.

chased a decreasing amount of gold. With more security over tenure, miners have been able to invest in their ventures with confidence.

As with any business, such investment would not have been made or sustained if they did not pay off. Geographic features count in Guyana's favour for a successful small-scale mining sector. It is a large country in relation to its population; 763,437 people in an area the size of the United Kingdom, with 90% of the population living on the coast. It is rich in gold, but the deposits are scattered in such a manner over the harsh topography of the country that establishing large-scale mining operations is inherently unattractive, leaving the mineral for small-scale prospectors. For a rough estimate of the profitability of operations, if the value of gold exports for 2009 of US\$28,1678,300 is divided between the estimated 12,000 miners, then a figure of US\$23,473 per head is reached. This is of course an extremely rough calculation; large amounts of gold goes undeclared, miners do not receive the world price for their gold, and findings are divided into percentages amongst workers, investors and landowners. But it does illustrate the differences in incomes between Guyanese small-scale miners and their counterparts elsewhere in the world, the majority of whom live on or close to near subsistence levels. In short, Guyana has a small amount of miners extracting a relatively large amount of gold in a huge amount of space.

### **2.2.1 Types of mining**

**Land dredging:** By far the most common method of extracting gold (and diamonds) is 'land dredging'. This refers to the process of using powerful hoses to pulverise gold-bearing material into slurry, which is then passed over a sluice box to retrieve gold particles. Over 1000 land dredges were registered in 2003 (Lowe 2005). It is the predominant technique used in extraction of alluvial deposits, by anecdotal references brought into Guyana by incoming garimpos from Brazil, where the practice is firmly established. Vegetation cover and topsoil ('overburden') is stripped by excavators, chainsaws and dredge hoses before mining commences. Dependent upon depth of deposits and levels of investment (or both), excavators are also used to pile and excavate mineral-bearing materials prior to and whilst dredging. The range in size of operations is substantial. Whilst some pits may have walls more than fifty feet deep and dwarf the miners working them, others may only be a few metres deep or take the form of near-surface channels a few feet deep, following what the dredge worker sees as being a promising deposit. Miners usually work in gangs of between three to ten, dislodging

material with the high-pressure hoses and channelling it towards manually controlled gravel pumps, attempting to ensure that large objects are removed before it reaches a ‘pump man’, who controls the rate at which the mixture of gravel and water is fed into the raised sluice box. ‘Head boxes’ often in the form of converted oil drums are employed at the entrance to sluices to filter out any large objects sucked through gravel pumps. The sluice box, which may be located some distance from the working pit, is fitted with carpet overlaid with differentiated patterns of metal ‘riffle’ sheeting. Material is also pumped through ‘lavadors’ for specifically collecting diamonds in some locations, but these are somewhat of a rarity. The entire set up is powered by substantial generators. Settling ponds and water recycling methods were observed in nearly all but the smallest sites; that is, collecting slurry from sluices and water from hoses into ponds or disused pits for so that the sediment settles, leaving water for repeated use, rather than pumping water directly from creeks and rivers.



**Left: Land dredgers channelling material to the pump man. Right: Typical sluice box**

Other (and notably less common) forms of mining include:

**Hard rock mining employing hammer mills:** Adopted when deposits are found in the former of ‘stringers’ or veins of gold. Hammer mills are used to crush material before passing



it over a conventional sluice. These types of deposits are uncommon in Guyana, with alluvial deposits accounting for the bulk of gold reserves.

**River dredging:** Familiar to other locations around the world, river dredging involves using suction pumps with penetrating ends (which is missile shaped, giving the equipment its moniker) to suck gold-bearing deposits from river beds and pass them through sluices mounted on floating platforms. These types of dredges range from relatively small craft to platforms tens of metres long. There has been a drop in the number of river dredges working the numerous waterways of Guyana, reportedly in response to the practice being increasingly uneconomical, and not more than a handful were seen during the period of research on rivers that miners informed me had previously been profitable and extensively worked locations like the Essequibo River.

**Individual land dredging and ‘punting’:** Some individuals opt to rework tailings on other people’s claims, either as a ‘punter’ merely panning material manually, or by operating a single dredge hose and a small, simplistic but transportable sluice which they lie on nearby ground and direct blasted material over it.



**Left: A ‘punter’. Right: A man working a solitary dredge and ground sluice**

**Metal Detectors:** Also relatively popular with solitary prospectors is the use of metal detectors, which are used to locate near-surface deposits containing coarse gold (as the equipment will not detect very fine particles). The material is extracted with shovel and/or pickaxe, passed through a sluice and then panned.

**‘Pork Knocking’:** This is reminiscent of traditional methods,<sup>11</sup> whereby one man or a team of men extract shallow placer deposits with simple tools and pass material over a short sluice before refining it by panning.

It is worth noting at this point that ‘punting’, use of metal detectors and ‘pork knocking’ are the methods that account for unregistered mining in Guyana; that is, operating on somebody else’s land or without the requisite license. The logistics of transporting any equipment heavier than what is required for any of these activities (such as dredging hoses and generators) inconspicuously is obvious. It is hard to judge the levels of unregistered mining in Guyana, but it is likely to be insignificant. Whilst it is undoubtedly higher than official estimates - which place it at virtually zero (Hilson & Vieira 2007) - due to the huge unmonitored areas which could be worked, the inaccessibility of such areas also acts as a barrier to prevent high levels of unregulated mining. Infrastructure in the country is limited, and the terrain is extremely challenging to negotiate. In the interior, most roads owe their existence to logging industries or now-defunct mining activity (such as at Matthews Ridge). Otherwise, they have to be created from scratch by excavators and chainsaws. Often suitable mining locations are situated many miles away from the nearest town. To establish an illegal operation of any size cannot be done cheaply or inconspicuously.

In all methods, material captured in sluices is washed at regular intervals, and often twice; first for diamonds using shaking boards and then for gold using gold pans or battels. Coarse ‘nugget’ gold can be picked directly from sluice carpets or riffles on washing down or from the battel during panning. Finer gold is obtained by ‘spinning the battel’ to filter down material to gold-bearing black sands and then forming an amalgam with mercury and burning (usually performed without a retort; an issue discussed later).

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<sup>11</sup> and probably most similar to much current African artisanal mining techniques



**Left: Nugget gold picked from a sluice. Right: ‘Spinning the battel’**

Another feature of Guyanese ASM – again, surprisingly given the high levels of mechanisation on sites – is a lack of proper mineralogical assessment work to determine the richness of deposits prior to staking a claim and the commencement of mining, and efficiency rates of equipment in terms of gold recovery thereafter. Miners are often reluctant to hire qualified professionals to assess land, do not have access to or the knowledge to interpret geological maps detailing deposits, instead often having to rely upon rudimentary panning samples and guesswork alone. The economic losses which would occur if a miner pays for all the necessary logistics of establishing a working claim only to find that it yields poor returns can easily be imagined. Losses of gold occur through land dredging as the hoses are unable to effectively break down some of the thicker clays and soils, and through sluice boxes, which are often set up with due care and attention to important aspects like gradient, width and settling rates. As an industry observer commented; ‘the spending is big, but the thinking is not’.



### **2.2.2 Economic aspects**

Mining operates under a series of arrangements for land, equipment and pay.

Large tracts of proven mineral-rich land, such as areas in close proximity to Mahdia, are held by notably prominent local figures. These individuals may of course work the land themselves if they wish or, more often the case, reach an agreement with interested parties to work sections of it in return for a percentage of what they find, usually 10% of profits. Smaller and more scattered parcels of land are also held by these large landowners, but it is these types of concessions that more minor investors are likely to secure. Investors come from a variety of backgrounds, from more expected figures such as the miners who will work the land directly themselves, to gold dealers and local businessmen in mining areas, to more unlikely candidates such as doctors, policemen, and other professionals from coastal regions.

Equipment like dredges, gravel pumps, generators and even excavators are very often owned outright by miners and investors, who also usually purchase four wheel drive vehicles,<sup>12</sup> boats, and chainsaws. This is an apparently sensible choice given that hiring equipment is prohibitively expensive and accordingly uncommon; to hire a dredge for 20 hours would cost in the region of G\$45,000 (£150/C320), and excavator hire was much more. Moreover, money can be made in charging miners working at other sites for transport in between camps and the nearest settlement.

Arrangements for pay vary according to individual agreements, and specific jobs. Dredge workers receive a percentage of whatever gold is found, sometimes (but very rarely) on top of a fixed daily or weekly salary. The percentage is divided equally between the workers after the landowner, investor/sponsor, and gang leader receive their cut. Drivers, excavator operators, cooks and other peripheral positions receive a fixed wage per month, day, or hour. It is unclear whether money for food, repairs of equipment, supplies, or other externalities are recouped in the form of lowered gold prices given for employees' gold or percentage cuts (as is the case in other set-ups, for example many African countries; Hilson & Pardie 2006, Spiegel et al. 2006) although (Lowe 2005) suggests that this is the case for operations that receive private financial backing. Miners who are self-funding or free from such

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<sup>12</sup> The Toyota Hilux being the predominant vehicle of choice

arrangements and individuals purchasing gold from miners are able to sell their gold to licensed gold dealers situated in nearby settlements, and generally receive close to the world price.

### **2.3 Environmental impacts**

Despite; firstly, the apparent differences between Guyana and most other small-scale mining regions in terms of mechanisation, investment and (assumed) profit levels and the apparently high baseline educational levels of participants; secondly, the existence of comprehensive legislation and institutions charged with enforcing them (see below); the environmental consequences of Guyanese ASM activity have been similar to other ASM settings, with impacts ranging from the starkly obvious to not immediately apparent.

Guyana is a particularly rich country in terms of biodiversity, with the region's forests, savannas and wetlands supporting hundreds of different species of birds, mammals, fish and reptiles, including rarities such the Arapaima (the world's largest freshwater fish), Black Caiman, and Giant Otters (Mistry et al. 2004). Little in the way of scientific study exists in assessing the situation, but Miller et al. (2003) and Mistry et al. (2004) both warn of the potential damages mining can have on the fragile environmental balance here, and the well-detailed damage that has been caused by ASM in the Brazilian Amazon Basin should also be a cause for concern (e.g. Branches et al. 1993, Reuther 1994, and Lacerda et al. 1990) as the ecosystems in mining regions of Guyana are extremely similar.

Roopnarine (2006: 119) writes that 'the environment is subjected to deforestation, pollution, dredging, discolouration, siltation, and land sterilization from mercury use in mining activities'. The range in sizes of sites and their environmental impact is considerable; whilst some may be small clearings in the still pervasive forest cover of Guyana, at others such as 'White Hole' and St. Elizabeth Hole' in Mahdia environmental destruction is more or less total and the surroundings bare similarities to 'lunar' scenery found at large-scale operations. As well as being obvious scars on the otherwise lushly forested landscape, open pits form hazards and are unsuitable for other land uses such as farming or building. Stagnant tailings pools or reservoirs act as breeding grounds for mosquito larvae and increase the risk of already prevalent malaria in mining regions. The diversion, siltation and pollution of creeks and rivers are other keys forms of environmental degradation. When material running from

river dredges, land dredging hoses, or sluice boxes is allowed to run into creeks and rivers untreated or before it has completely settled, the turbidity of the water is strongly affected. Large plumes of sedimentary discharge can be seen emanating downstream from some mining sites, and the levels of matter in the water can be affected to the extent where very few species can survive in it. The course of rivers can also be unnaturally altered by disruption of sediments by river dredges, or the excessive loads running off from land operations. Petroleum from boats and dredges can also often be seen floating on top of water courses. Reclamation is almost exclusively not carried out, despite it being a requirement in the law.



**Environmental destruction caused by ASM**

#### **2.4 Legislation, governmental authorities and other actors**

The Guyanese government has long recognised the significance of small-scale mining and has adopted a generally accommodating attitude towards the sector whilst assuring that it will attempt to mitigate its negative consequences. Both these aspects are emphasised in its Mineral Policy and Fiscal Regime and National Development Strategy. The country has, on paper at least, a well-established regulatory system in place for all nearly aspects of small-

scale mining. Revisions in mining codes have been consistently made over the last 40 years in accordance with changing mining conditions as increasing levels of capital and technology have been introduced into the sector as easily accessible sources of gold became exhausted and deeper deposits were sought.

The institution charged with the governance of the mining sector, the Guyana Geology and Mines Commission (GGMC), was created in 1979. Split into four divisions (environmental, geological, mines and petroleum), which were created at later dates, it has the mandate of facilitating investment in, and regulating, the country's mining sector. Performing this task includes promotion of the country's minerals to potential investors and traders, undertaking exploratory and prospecting work of mineral reserves, conducting research into these and processing methods to improve information to the mining community, and regulating operators to ensure sound practice is adhered to. The Commission is expected to improve access and processing of mineral reserves through the provision of appropriate technical assistance and geological information to both large and small-scale mining operations. Significantly, it is also in control of issuing and subsequent monitoring of compliance to regulations of various mining licenses and concessions, and collection of required taxes and levies.

The two primary pieces of modern mining legislation in the country are the 1972 and 1989 Mining Acts, with other laws and regulations pertaining to various levels of mining spread out in other more minor documents. The implementation of the 1972 Act represents the last full revision of Guyana's mining laws, although the 1989 Mining Act which came into effect in 1991 brought into force significant amendments to this code, encompassing 'a range of issues such as prospecting, surveying, quarrying and mining on different scales; licensing and registration of operations; mining on Amerindian lands; health and safety on mines; and taxation' (Lowe 2005: 20). Another significant piece of legislation is the Guyana Gold Board Act issued in 1981, which declared the government the sole purchaser and exporter of gold in the country, and established a Gold Board to fulfil this function. The Act was relaxed in 1997, permitting licensed dealers to also purchase and export the metal.

In terms of environmental regulation, the 1996 Environmental Protection Act is significant in representing Guyana's first piece of environmental legislative literature. The Environmental Division of the GGMC is charged with monitoring environmental standards within the

hundreds of small-scale mining set-ups across Guyana in collaboration with the Environmental Protection Agency (EPA). Both departments exist in their present form owing to the bilaterally backed Guyana Environmental Capacity Developmental Mining Project (GENCAPD), which is discussed in more depth later. Following suite with various developing nations' actions around the same time, the Act is based upon Western legislation for assessing environmental impacts of various activities (including mining). There are also the Mining Environmental Protection Regulations established in 2000 and penned 'Codes of Practice' which apply to small-scale operations.

In terms of relevancy to small-scale mining operations, the main aspects of regulation are as follows:

- Distinctions are made between levels of mining (small, medium and large scale) through claim size alone, rather than levels of production or mechanisation. Mining which one may assume to typify 'artisanal' operations in the typical concept of most countries fall under the country's smallest categorisation which permits claims of a fixed 27.5 acres on land (with medium scale being classified as between 150 and 2000 acres) and a maximum of one mile (0.6 km) for river concessions. Licenses are initially issued for one year, but can be renewed every year for an indefinite period. Different sizes of concessions are subject to varying levels of compliance.
- Each miner must obtain a license to mine in any form. A prospecting permit must be obtained to undergo exploratory work prior to 'locating' a claim (i.e. a potentially profitable deposit). At least one of the applicants must be Guyanese, although joint ventures are permitted with non-nationals. Mining Privilege must be obtained to work on land owned by somebody else. A license is required to be a labourer on a claim holder's land. Each dredge owner must also be licensed. All of the above are issued and monitored by the GGMC.
- Between 3-5% in royalties should be paid, depending on the world gold price; less royalty is paid should the price of gold drop. 2% of profits should also be paid on top of normal income tax.
- Environmentally, small-scale miners are bound to follow all of the afore-mentioned pieces of legislation, which make provisions for correct storage, handling and disposal of poisonous chemicals like cyanide and mercury, the use of retorts when burning the latter, responsible use and treatment of the surrounding waterways and forest.
- All gold must be sold to the Guyana Gold Board or to licensed dealers.

- Mining on or near land designated as Amerindian land or as a National Park is strictly prohibited.

Mining laws in Guyana were put into a review process several years ago, in an effort to draw mining legislation together in a unified code rather than its current state spread through various acts and policies, but so far no new legislation has emerged. In the meantime, small-scale mining operations are governed by the existing laws which are discussed below. The awaited revised mining laws are expected to represent much bolder and stringent regulations for small-scale operations to adhere to, including the following:

- A register of poisons at mining sites, which should be completed and ready for inspection
- Mandatory use of retorts, gloves and protection when using mercury
- Mandatory creation of tailings ponds
- Restoration of exhausted mining sites

Taken from Lowe (2005: 39)

Although the legislative framework is robust on paper, its existence and enforcement are entirely different matters; stated commitments to ensuring an adequately supported and environmentally friendly mining sector are not met with reality. The GGMC shares characteristics with the regulatory bodies in many developing countries in the respect that it is severely underfunded and overstretched. Logistically and financially the GGMC cannot, or indeed be expected to, effectively meet its mandated responsibilities.

Government departments in the country are chronically underfunded, and GGMC is no different. It has problems filling the various regional stations around the country. Even if it were to, the number of staff would still be woefully inadequate to assist and monitor their designated areas. Take as an example, the GGMC office based in Mahdia, one of the country's largest small-scale mining towns; the handful of staff here is expected to assist and monitor huge swathes of land containing dozens of displaced mine sites in terrain that dictates that travelling any distance at all can take days. The same team is also expected to monitor the entire of the Kaieteur National Park, an area of 30,000 square miles which also falls in their jurisdiction, to ensure no encroachment is made onto protected areas by miners!

At one site around 7 hours travel from Mahdia, the miners stated that the authorities had never been to see their operation, which had been in existence for around a year, because it was too far for them to come. All of this is of course is on an insufficient budget. Similarly, in the North West of the country the GGMC regional office is located several hours drive from the nearest substantial small-scale mining activity in Ararkaka.

Poor pay and demoralising conditions not only ensures that there is a high turnover and poor quality of staff, but also encourages corruption. These compound the already lacking capabilities and negative image of the agency respectively. Miners and other observers commented that there had been a decline in the technical skills and field experience of officers, referring to how officers used to be sent abroad for training whereas now they were selected with minimal qualifications and experience. They resented the fact that the Commission acted solely as a policing force rather than being able to offer any valuable assistance. Corruption on the part of GGMC field officers was a universally mentioned issue by miners and external observers. Their income may in fact be below that of some miners, and is almost certainly less than landowners or concession holders. If any violation of regulations or requirements was observed at sites, a payment of cash or gold was likely to ensure that the matter was forgotten.

A lack of both efficiency and authority on the agencies part has meant that a large proportion of small-scale mining in the country carries on in a completely unenforced or unmonitored fashion. Although nearly all miners are registered, the vast percentage does not adhere to regulations, either at all or in one form or another. The chances of being caught are absolutely minimal, and the chance of being punished for violations is even lower. Encroachment of miners onto land designated as National Parks and reserves, persistently high levels of non-declaration and rampant smuggling of extracted gold<sup>13</sup>, constant evasion of tax and royalty payments, and the continued pollution and disturbance of rivers are all prominent examples of the authorities' inability to control prohibited activities.

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<sup>13</sup> especially by Brazilian miners crossing the border between the two countries

## **2.5 Other institutions**

Notable non-governmental institutions in terms of assistance to and influence over Guyana's small-scale mining sector have been the Canadian development agency (CIDA), the World Wildlife Fund (WWF), and the Guyana Gold and Diamond Miners Association (GGDMA).

CIDA has been a major influence in Guyana's ASM sector, mostly of the back of its GENCAPD project, which ran from 1998 until 2004. The project aimed (as its name suggests) to enhance the environmental management capacities of key players in Guyana's ASM sector; namely, the GGMC, EPA and GGDMA. Addressing what it saw as a lack of policies, guidelines and regulations relating to environmental aspects of the mining sector, a deficiency in underlying data and assessment work to inform these, and the need for greater promotion of better mining practice, the \$Can3.75 million initiative included training of the involved institution's staff, education and training of miners, the collection of environmental data, and the drafting of new environmental codes of practice. The initiative is by far the biggest undertaking the agency has ever done in the country and has been extremely influential in informing debates and interventions relating to mining in the country.

The agency still has a presence in Guyana, maintaining an office with around two workers in it, but it has done next to nothing following the end of its GENCAPD initiative. No complementary follow-up work has occurred. This may be partially explained by a shift in the agency's aid priorities away from natural resources towards more en vogue topics like 'alternative livelihoods'. It may also be partially explained by the backgrounds of the remaining members of staff, who have little training or interest in mining. Whatever the case, CIDA appears to be set on dealing with peripheral issues in Guyana's ASM sector, such as novel occupations to draw people away from mining, rather than offering assistance to those already in the sector, even though it is well established and very much in need of it. The pursuit of an ornamental fish scheme serves as a good example of this. Fitting the niche of an 'alternative livelihood' intervention, this scheme aimed at using worked-out pits as ponds for raising ornamental fish. The ability of the project to generate any sizeable level of employment, and the viability of promoting of a product that must have a well established and limited market already, and moreover has no local demand, is questionable. In addition, complications appeared once the project had been started. Men, from whom the mining sector in Guyana is entirely comprised, were not interested in raising fish, meaning that women (who do not mine) were raising them.



It appears one of the main external agencies that have been an important influence on the country's small-scale mining sector is scaling down its activities in the sector, if not in the country as a whole. Many of the activities which would have served as genuinely useful ongoing concerns, such as education of miners, publishing of topical literature, training of governmental staff, and environmental monitoring all terminated with the end of the schemes funding, even though ground-based action has obviously been generally well-received and impacting within mining communities and showed significant potential for genuine change. But the seminars, workshops and provision of improved technologies such as retorts have proven to be isolated events. The mercury intervention work discussed below provides evidence of both of these previous two points.

The WWF has been, and continues to be an important independent voice and body in Guyana's mining sector, demonstrating a commendably sustained commitment of work and funding. It has run a European Union financed scheme of around €973,000 working alongside miners for many years, culminating most recently in the organization's launch of a Goldmining Pollution Abatement Programme, part of their larger Sustainable Forest Resources Management Project. Alongside running training seminars for miners and GGMC staff alike whenever possible, it has also carried out independent environmental assessment work, and is extremely vocal and influential in national stakeholder meetings and in the media.

Lastly, the GGDMA should not go unmentioned as a significant institution in the Guyanese ASM industry. Formed in 1984, it provides a strong voice for miners in governmental discussions and other stakeholder forums, as well as in the national media. Issues of contention on the part of miners the GGDMA has strongly voiced include; corruption by GGMC staff; lack of technical assistance by GGMC; and mercury use and regulation. It also has its own team of mines officer specialising in environmental and technical issues. Miners pay a annual fee for membership of the Association, and as well as the representation detailed above, are able to call upon its expertise for general advice, technical assistance and to resolve disputes that may arise with other miners or external parties.

### **3. Mercury as a case-study**

Mercury is used in all small-scale mining in Guyana to recover fine gold particles from concentrated panning. Although it has been used for many decades, starting with the original pork knockers, it is only in the past 20 years or so that it has been identified as an area of concern for Guyana's environment. Concern began to build as increasing amounts of people began to move into the interior, including immigrating illegal Brazilian miners with a reputation for environmentally reckless behaviour, and research from around the world (in particular neighbouring Brazil) began to reveal widespread damage being caused by mercury emitted from ASM operations. Accordingly, mercury use, emissions and pollution stemming from ASM has been a central focus of much of the governmental and multilateral intervention work which has concurrently influenced legislation. As one of the most prominent issues relating to small-scale mining in Guyana, it serves as a useful case study in contextualising many of points raised in the preceding overview.

In terms of work assessing the real and potential impacts of mercury in Guyana, the most comprehensive work was carried out as part of the earlier mentioned GENCAPD project (itself a response which analysed water, sediment, soil, and fish samples as well as collecting data from humans in mining and non-mining areas of the country. The studies concluded that mercury exposure was not a danger to miners or environment in mining areas of the country, but that it did pose a threat to ecosystems and communities some distance from mining areas. The main reason given for the counter-intuitive results was that the sampled community in the non-mining area relied upon fish – which contained elevated levels of methylmercury – as a large part of their diet, whereas members of mining communities did not consume high levels of fish. Samples of soil, sediment and water were reported to be normal parameters.

The GGMC interpreted the findings of the GENCAPD - that mining area populations exhibiting lower exposure levels than communities remote from such activity - as an indicator that ASM is not a significant contributor of Hg in the nation's environment and concurrently as the situation being manageable, attributing raised levels to natural environmental processes (which have been speculated to elevate mercury levels in tropical environments). However, alternative readings of the data can be raised. For instance, within the data it was reported that individuals who had been in the studied mining towns and camps for the longest periods exhibited the greatest signs of mercury exposure, as opposed to new arrivals that exhibited the least. One would expect this to be indicative that occupational and

collateral exposure to Hg does occur over time in these areas, but this data was largely ignored in interpretations of the GENCAPD assessments. In addition, if the non-mining community sampled were notably more at risk to mercury exposure from their diet, is this also not evidence to suggest that mercury levels are already elevated to a potentially harmful level, even if not all individuals (i.e. miners themselves) are exposed to it? Had the non-mining group been exposed for long periods to raised levels of mercury, having eaten large quantities of fish with naturally elevated mercury compounds? Or, is this increase a more recent phenomenon?

Too little is known about the sources, pathways, and risks that mercury poses to the environment and human health. There is an insufficient depth and breadth of work to accurately assess the situation in any country with small-scale gold mining activity. The lack and reliability of data is not surprising when one considers not only the difficulty of understanding the behaviour of mercury, and also the relatively recent nature of the work conducted into trying to map such things. Prior to the 1970s in Western countries, and a decade later in developing nations, work which attempted to assess mercury levels and exposure was not an established research area (Clifford 2010). Moreover, mercury is a persistent environmental contaminant which can be released from sinks many years after its initial deposition. It is also a slow-acting poison in human beings. It is reasonable to expect that the full environmental and human impacts of the expansion of small-scale gold mining and its thirst for mercury should not be expected to demonstrate itself straight away, but in years to come due to 'lag effect' on these processes (such as those mentioned by Lacerda 1991, and Nriagua 1994). Both of these factors give even more reason to suggest that the potential impacts of mercury should certainly not be underestimated. The GENCAPD work which resulted in these findings is now over a decade old. As has been observed, ASM gold production has more than doubled since the data was collected. With every small-scale operation in the country is using mercury in processing their gold, the likelihood is that mercury contamination in Guyana is a quietly escalating problem.

Describing additional research conducted into mercury use in the sector, Lowe (2005) reports two studies conducted in Guyana by the Environmental Division of the GGMC, and by the country's Institute of Applied Science and Technology (IAST). The GGMC work into safety practice revealed that gloves and masks are almost exclusively not present when handling the element and that careless handling is noted to be frequent. Addition of mercury directly to

pits or sluices noted by some (Hilson & Vieira 2007) is, however, contended by GGMC officers to be in decline due to 'rigorous enforcement efforts.' The IAST study, which was funded through the WWF and analysed fish, urine and hair in a long-standing mining community, concluded that these people that were closely involved with mining activity were significantly exposed to mercury. Talking of this work, Lowe (2005: 15) contends that: 'the results of these studies confirm that mercury use practices are unsatisfactory among local miners and that serious contamination effects have occurred to the extent that residents in several gold mining communities may be threatened. Nonetheless, because the environmental and health effects of mercury pollution are not readily visible, doubt exists within the mining community over whether Guyana has a "mercury problem" (an assertion that supports the argument above).

As mentioned previously, new legislation has been tabled to incorporate more recent changes in the dynamics of the sector, especially concerns relating to environmental damage. Much greater emphasis has been placed upon environmental protection and improved occupational health. Mercury pollution issues are covered under the policy and legal framework that has been developed in the country over the last 15 years, and by the institutions that were created as a result of such action. The creation of the 1994 National Environmental Action Plan and 1996 Environmental Protection Act outlines national policy and standards, as well as highlighting considerations for incorporating environmental issues into all levels of planning. The initiatives stress conservation and sustainable use of natural resources, stringent assessment of any activities that may contradict this principle and punitive measures for violations of it. The GGMC (particularly its Environmental Division) and the Environmental Protection Agency (EPA) jointly undertake work on managing environmental issues associated with small-scale mining.

Specifically relating to mercury, the Mining Act 1989 outlines how miners are forbidden to dispose of mercury in waterways and handle the metal without gloves, outlines how it should be stored, and stipulates that due care should be taken when burning. The 2000 Mining Environmental Protection Regulations, and 'Codes of Practice', which miners are all required to obey, outline how mercury should be used in closed circuits (retorts).

No research has been conducted to assess how impacting the introduction of legislation, attempted introduction of equipment like retorts, and educational efforts relating to mercury

awareness have been in mining regions. As Hilson & Vieira (2007) state that there has been a concentration on effects-based research meaning that ‘pressing questions such as: are miners aware of the health implications of mercury; what appropriate technologies are available for reducing exposure to mercury; and what barriers prevent the dissemination of mercury-free technologies, have been seriously overlooked’ (429, emphasis in original). It was these types of questions that the author’s research attempted to analyse.

Miners were certainly aware that mercury could affect human and environmental health. Almost without exception, miners had heard or had read information relating to the effects of mercury. Information was available from several sources, and the ongoing commitment to awareness and education was a commendable effort. Pamphlets were given to miners at regional offices and also at the national headquarters of GGMC in Georgetown, and posters here and occasionally seen around mining areas warned of mercury being dangerous. Media such as radio and newspapers (the latter are widely read by miners) also appeared to have ongoing messages and features respectively. A couple of posters related to mercury use and dangers were also seen at two locations in the country.

Dangers and effects cited by miners correlated with the main findings of previous assessment work, and to initiatives pursued by them. For instance, when questioned about how mercury is dangerous, nearly all miners mentioned the fact that mercury can get into the rivers and poison fish, one of the main findings of the GENCAPD work. Another interesting piece of given by miners was that it had been related to them that mercury exposure can make people impotent; an effect that is by no means proven, but that has been used as part of educational campaigns in places like neighbouring Brazil. Whilst the ethics and longer term validity of spreading this information as part of interventions has to be questioned (i.e. what will happen to already mistrusting relationship between authorities and miners should they find or indeed experience (!) that this is not true), it has been found to be impacting way of getting the message of mercury danger across. It would appear that the impotency message has its root with the WWF’s work, with a source claiming that: ‘that was a rumour that was spread by a couple of us to get them to be a little bit more concerned, but it’s not true’.

Miners also knew about retorts; how they worked, where they could be bought from, how much they cost, and why they should use them. But it was obvious that such knowledge and access to equipment did not translate into change of practice. When visiting a site with a

Mines Officer, on more than one occasion miners had difficulty locating their retort; numerous models could be seen rusting away and collecting dust around the camp having clearly not been used for some time; and when conducting research alone, no retort was ever seen being used, the most commonly held practice for stopping mercury was to place a leaf over the tin when burning, apparently with the conviction that it stops mercury fumes on its underside.



**Left: Metal retort. Right: Open burning of amalgam on fire**

Educational and technical assistance has been sporadic and of a rather detached form. The most significant push in terms of education and assistance came as part of the GENCAPD project. Workshops educating miners on the potential dangers of mercury and introducing them to retorts were held in the capital Georgetown and in several mining regions. In complement these, literature in the form of brochures, booklets, and training manuals as well as videos were produced and disseminated. The WWF has conducted similar work where it has had the capabilities. But there has been little to no further ongoing educational and technical assistance offered to miners, despite the information that has been disseminated through media, occasional workshops and seminars obviously having an impact in raising awareness amongst miners, as evidenced in the repeating of mercury messages and

familiarity with technologies such as retorts (and a very select group with more advanced options like shaking tables). But ‘it is incorrect to assume that miners would adopt mercury retorts [or other mercury abatement technologies] on their own following single seminars’ (Hilson & Vieira 2007: 437) or indeed that anything other than a small percentage of the mining population is impacted by each such seminar. The way in which mercury issues and mining issues more generally have been circulated in and given vibrant reporting by national media is commendable, but this should be a complement rather than a substitute for direct interaction with miners. Education and technical assistance and messages must be continuous in order to be fully effective.

Explaining why miners are reluctant to adopt safer practice with respect to mercury despite knowing of its potential harm to themselves and the surrounding environment essentially comes down to two possibilities; firstly, that miners are making a fully informed choice to use mercury in an irresponsible fashion and to reject equipment capable of limiting emissions; or secondly, there are limitations with the way in which interventions relating to mercury abatement have been conducted meaning that miners are not sufficiently sensitised to or convinced about the dangers of mercury and the benefits of limiting its careless release. It is of course realistic that both possibilities exist concurrently. There are always a minority of people with limited concern for themselves or others. It is the second group that can be reached by appropriate work and assistance.

#### **4. Future prospects for Guyanese ASM**

Pressure is mounting on Guyana’s small-scale gold miners to adhere much more closely to the country’s penned environmental legislation, with the government recently making strongly-worded statements committing to improving environmental management as it pursues and increasing ‘green’ agenda. At the launch of the Guyana Low Carbon Development Strategy (LCDS) in June this year, the Prime Minister Samuel Hinds, President Bharrat Jagdeo and the GGMC have all informed miners through national media that small-scale mining cannot and will not continue in its existing fashion under the scheme that looks to achieve ‘economic development in an environmentally sustainable way ...[with]... a key part of the strategy ...[being]... the deployment of Guyana’s rainforest towards addressing global climate change’ (Stabroek News, June 28th 2009). The issue of mining and pollution links is and will continue to be a particularly prominent one with LCDS and the similarly

targeted Reduced Environment Degradation and Destruction (REDD) both taking an aggressive stance on undesirable mining practice. The pursuit of the country's sustainable development agenda is admirable in attempting to maintain and/or improve its impressive forest reserves and biodiversity, but must be questioned on the level of viability. The burgeoning small-scale mining sector is entirely at odds with such a path in its present form, and although the sector doubtlessly is a focal point for environmentally destructive behaviour, it is also a huge provider of employment and economic mainstay in a country with high poverty levels and insignificant alternative sectors respectively. Whether the government can back its stated intention to clamp down on environmentally degrading practice given its ability to monitor the sector in its current form, and, in the longer term, whether it can realistically find viable alternative livelihoods for the many thousands that may have their occupations taken away with a rigid pursuit of such policies, will determine the success of such development paths.

The imposing ban on mercury exports from Europe and nearby North America will have an unknown impact on availability of the element, although the chairman of the GGDMA Edward Shields has been vocal in his opinion that the relatively minor amounts used and the proximity of the country's main supplier, Brazil will mean that flow may continue uninterrupted. Leading figures in the GGMC and GGMDA have agreed, however, that the mining sector has and can be responsive to external calls for the adoption of improved technologies and environmental performance. GGMDA Chairman Shields has insisted that miners have 'no particular attachment to mercury' and suggested that there is an improved relationship of miners with environmental agencies, but emphasised the point made by many others that a movement away from using the element and pursuing alternatives must be economically prudent. Should the flow of mercury be significantly stemmed increasing prices and decreasing availability, it will be interesting to see if and at what point retorting technologies are more readily adopted by miners.

Should the Guyanese government back its verbal commitment towards more rigid policing of environmental standards in the mining sector, it will be interesting to see how the industry responds. Such an important economic mainstay of the country's economy will not, and cannot, be completely halted. Nor can prevalent practices be changed overnight. Even if the authorities somehow muster the logistical clout to physically enforce policies, which they so



clearly lack at present, they will have to tread a fine line between squeezing and crushing what is one of the nation's only thriving industries.

## **5. Conclusions**

This brief overview has attempted to highlight some of the main features and pertinent issues of the Guyanese ASM sector. In some respects, Guyana provides a context quite different to those familiar to many ASM regions; a longstanding recognition of ASM and rigorous written legislation and dedicated authorities, relatively high levels of investment and mechanisation, a sector not driven by poverty and made up of a literate and skilled workforce, and small and medium scale operations existing as the only gold mining activity in the country. In other respects, it shares a numerous similarities to other small-scale mining locations worldwide; haphazard approaches to mining, widespread environment degradation and contamination, non-adherence of penned regulations and requirements by miners, the inability of authorities to monitor mining activity and punish offenders.

Elements of the Guyanese sector contain transferable lessons for ASM localities elsewhere. Lengthy representations of small-scale mining in official channels, increased levels of investment and mechanisation, improved economic circumstances of those involved in the sector, and raised levels of education and awareness relating to deleterious practice, its consequences, and potential solutions (mercury use has been given as an example) do not necessarily translate into an superior set of circumstances within ASM. Whilst this is a worrying and slightly depressing thought for policymakers looking to pursue avenues of assistance similar to those described in the Guyanese case study, it is worth reiterating the numerous limitations that have characterised dealing with the sector, many of which are common to countries with less 'advanced' small-scale mining activity; lack of financial and logistical resources by governmental authorities to successfully support and monitor mining operations; an unwillingness to conduct ongoing educational and technical assistance on the part of government and donors; contending with the complex and challenging socio-cultural systems of small-scale miners.

Mercury use is demonstrative of the fact that the Guyanese ASM sector displays on the one hand, many positive changes with the respect to mining practice in terms of awareness, education and knowledge of and access to safer, alternative practices. On the other, efforts to

instil such understanding in miners appear to have counted for nothing as undesirable practice, such as those observed with respect to mercury, continue in exactly the same fashion as before. However, numerous shortcomings have been identified with the ways in which the sector is regulated and assisted.

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