



Development Minerals in Africa, the Caribbean and the Pacific

Background Study
2016



*Empowered lives.
Resilient nations.*

ACP-EU Development Minerals Programme.
Implemented in Partnership with UNDP
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About the ACP-EU Development Minerals Programme: The ACP-EU Development Minerals Programme is an initiative of African, Caribbean Pacific (ACP) Group of States, coordinated by the ACP Secretariat, financed by the European Commission and United Nations Development Programme (UNDP) and implemented by UNDP. This €13.1 million capacity building program aims to build the profile and improve the management of Development Minerals in Africa, the Caribbean and the Pacific. The sector includes the mining of industrial minerals, construction materials, dimension stones and semi-precious stones.

Précis

This study examines the state of the Development Minerals sector in Africa, the Caribbean and Pacific. Development Minerals are an indispensable source of employment, providing a source of livelihood to tens of millions of people across the developing world. Moreover, in a number of settings, the sector's contributions to national mineral production are now significant, helping to nourish domestic and sometimes even international supply chains. This report serves as a background study for the ACP-EU Development Minerals Programme, a three-year capacity building programme that is an initiative by the ACP Group, coordinated by the ACP Secretariat, financed by the European Commission and UNDP, and implemented by UNDP.

Development Minerals have been defined by Franks et al., (2016) as, 'minerals and materials that are mined, processed, manufactured and used domestically in industries such as construction, manufacturing, and agriculture. Development Minerals have a high degree of economic linkage and utilization close to the location where the commodity is mined.' The Development Minerals sector includes industrial minerals, construction materials, dimension stones and semi-precious stones. These commodities are sometimes referred to as Low Value Minerals and Materials (LVMM) due to their relatively low price as a function of their weight.

Intensifying support for the small-scale and mid-sized operators who make up the majority of the Development Minerals (DM) economy could certainly have a transformative effect, economically, in many ACP countries. This, however, promises to be an exceptionally challenging undertaking. Overall, small-scale mining has been afforded very little 'space' on the international development agenda, largely because donors and host governments have repeatedly overlooked its economic importance, as well as electing to pursue a strategy of extractive industries-led development that has emphasized the promotion of export orientated large-scale projects. There is the additional challenge of how to go about overhauling the policy and development framework that is now in place: it has evolved heavily around, and has been informed chiefly by experiences in, small-scale precious metals and gemstone extraction, at the same time paying very little attention to industrial minerals, construction materials, dimension stones and semi-precious stones which have enormous economic potential. This policy machinery has fuelled the sector's informality, which poses yet another challenge for donors looking to reach, empower and support operators.

The EU, UNDP and other donors have, in recent years, launched a series of development projects for small scale mining in a number of ACP countries. In order to avoid implementing costly standalone interventions that fail to have lasting effects, a policy framework that is more holistic in outlook and which connects DM to the broader development targets of ACP countries is needed. Laying this important foundation will enable the UNDP, European Union,

ACP Secretariat and partners to actively and realistically fulfil their stated objectives: to 'provide capacity-building support to the small-scale private sector, associations/chambers, public institutions and social stakeholders that operate in the low value minerals and materials sector', as well as 'enhance the capacities of these entities to increase the sector's productivity; better manage mining operations; adhere to national and international environmental and health standards; and prevent conflict through effective community relations'.

1. Introduction

This study reflects on the state of the Development Minerals sector in Africa the Caribbean and the Pacific. The sector is predominantly made up of local low-tech, labour-intensive, small-scale mining and mineral processing and mid-sized mechanized quarries. Records and accounts reveal that today, across the developing world, small-scale mine operators extract a wide-range of commodities, including construction materials, dimension stones, industrial minerals, and semi-precious stones. Over the past decade, the DM sector has become an indispensable source of employment in a number of ACP countries. These contributions have been direct, as well as indirect, through employment created in the downstream industries it spawns. Moreover, in a number of settings, the sector's contributions to national mineral production are significant, helping to nourish domestic and international supply chains.

Yet, despite these contributions, the sector's importance and potential role – if properly supported – as a catalyst for development continues to be overlooked by donors and host governments. 'Small-scale mining' was first introduced to the international development lexicon over 40 years ago by the UN in its landmark report, *Small-Scale Mining in the Developing Countries* (UN, 1972). But the sector continues to feature peripherally in the economic plans and policies of most ACP countries, a reflection of the ambivalence of donors and host governments toward it playing an expanded role in development. Upon reflection, *Small-Scale Mining in the Developing Countries* may have been a deliberate intervention, the ideas underpinning it, like so many development policies implemented at the time, likely lost following the onset of the oil crisis: it seemed as if, through assembling a collection of rich accounts of small scale mining from across the world and embracing a range of important themes, the UN was challenging donors and policymakers to think 'outside of the box' at a time when the development agenda was in transition and open to change. Initially, however, and as reflected in the academic literature, conference papers and policy documents which surfaced following publication of *Small-Scale Mining in the Developing Countries* (Alpan 1986; Noetstaller, 1987), the donor community appeared transfixed on small-scale mining being solely an entrepreneurial venture that should be regulated in the same way as large-scale activities, and not taking on a particularly significant role in the context of development. With the donor agenda at the time calling for the development of large-scale mining complexes and other big projects in extractive industries, and greater attention to be paid to more established development topics such as agriculture, water provision and poverty alleviation, not surprisingly, small-scale mining was overlooked.

The failure of policymakers and donors to fully embrace a small-scale mining sector that has played an expanded role in the economies of ACP countries over the past two decades has stymied its development and, by extension, impeded wider efforts to alleviate rural poverty. During this time, a flood of research (Crispin, 2003; Hilson and Potter, 2005; Banchirighah, 2006; Fisher, 2007) has been undertaken which points to small-scale mining having become

an important refuge for many hundreds of thousands of people made redundant under structural adjustment, as well as an indispensable source of income for struggling farmers who have been marginalized in a liberalized agricultural market. Continued treatment of the small-scale mining sector as a peripheral piece of the development 'puzzle', however, has confined its operators to an informal sector 'space': prospective licensees, competing on the same terms as their large-scale counterparts, have struggled mightily to mobilize the funds needed to secure the requisite permits and access land. The little momentum which discussions on formalizing small-scale mining have generated has been heavily stifled by growing coverage of a series of problems associated with the sector, including mercury pollution from gold mining, excessive land degradation, its association with conflict, health and safety concerns, and numerous 'social ills' in producing communities, such as high incidences of HIV/AIDS, and alcohol and drug consumption (ILO, 1999; Hentschel et al., 2002; UNECA, 2003; Hinton, 2005). But research (Fisher et al., 2009; Siegel and Veiga, 2009; Hilson, 2013) has shown that these problems are mostly 'expressions' of the sector's informality. It is, consequently, a sector about which very little is known. Most of the literature available on small-scale mining is unbalanced, providing insight on a small cross-section of the sector, specifically, its precious minerals segment, and largely ignoring the minerals and materials now defined as Development Minerals. The fixation on gold and precious stones is perhaps because of the allure of the commodities it produces and the global supply chains they are a part of. At the same time, a host of other minerals and material have received very little coverage.

This study brings together analyses of, and data on, DM, with the aim of legitimizing the sector's significance. The DM sector continues to receive very little attention on the donor and economic development agendas of most ACP countries: its potential economic benefits and contributions to poverty alleviation, therefore, have largely gone unrealized. The issues presented in the sections that follow will be analyzed against the background of this policy neglect and oversight. Throughout this report, 'small-scale mining' and 'DM' are often used interchangeably because the former is predominant form of mining of the later in Africa, the Caribbean and the Pacific. The large-scale mining of Development Minerals does occur, especially for commodities that in addition to national markets they are also exported internationally (for example, phosphates and some dimension stones), however this tends to be the exception in countries of the ACP.

2. Developing the Development Minerals Sector in ACP Countries

This study serves as a backgrounder for the ACP-EU Development Minerals Programme, implemented in partnership with UNDP. The programme seeks to 'enhance the capacities of these entities to increase the sector's productivity; better manage mining operations;

adhere to national and international environmental and health standards; and prevent conflict through effective community relations'. Doing so will require unravelling the DM policy framework that, as will be explained, has largely been developed in the image of the small scale mining of gold, diamonds and coloured gemstones sectors; and, which has been afforded very little policy space overall. The EU, UNDP and other development agencies have, in recent years, launched a series of development projects for small scale mining in a number of ACP countries (e.g. Greer Consulting, 2007; Tawake, 2009). The challenge moving forward is to lay a policy foundation into which such project work can be built and ultimately, be in a position to have a transformative impact over the long term.

The ACP is a grouping of 79 states – 48 in sub-Saharan Africa, 16 in the Caribbean and 15 in the Pacific – which has a 'special relationship' with the European Union. For the past three decades, trade relations between these two 'blocs' have been shaped by a series of 'bilateral' agreements: Lomé I (1975-1980), Lomé II (1980-1985), Lomé III (1985-1990), Lomé IV (1990-1995, later revised and extended to last until 2000, known as Lomé IV bis), and Cotonou (2000 to 2020). The latter was signed by representatives from 77 ACP countries, and is regarded as the most comprehensive agreement forged between developing countries and the European Union to date.

The economic challenges of ACP countries have been well documented. Most are landlocked or small island nations with limited capacities to generate economic development on their own, have low or even negative growth and which, therefore, fall into the World Bank's category of 'low income countries': at the turn of the century, 41 ACP countries were ranked among the poorest in the world (Korner, 2000). The problem, in most cases, is, as Table 1 illustrates, that these countries do not have particularly diversified economies, and rely on the export earnings of a small group of – typically, mineral, fuel and/or agricultural – commodities. At the time of Cotonou, 37 ACP countries relied on one commodity for more than 50 percent of their export earnings, one of the more extreme cases being Nigeria, where oil accounted for over 80 percent of exports to the European Union (Cline, 2004).

Most ACP countries have struggled to develop economically, their fates now heavily tied heavily to the Economic Partnership Agreements (EPAs) negotiated with the European Union – aimed at facilitating trade between the two groupings and to integrate the former into the world economy – which date back to the Cotonou Agreement. These EPAs have had the effect of deeply liberalizing the investment climates of ACPs. They seek to significantly consolidate the European Union's trade and development policy, in the process creating appealing investment climates in ACP regions, as well as establish technical and regulatory capacity to facilitate trade among these countries (Korner, 2000; EU, 2013). Cotonou has enabled some small agricultural producers in ACP countries to maintain their presence in the European Union but many could be under threat very soon because of the expiration of various terms of trade. For example, in the case of sugar, a European Union quota system

which caps EU beet sugar production, is set to expire in 2017, which would have deep consequences for producers in the likes of Guyana, Jamaica, Malawi, Fiji and Swaziland, and with it, the prospect of being squeezed out of the market altogether (Fairtrade, 2015). Facing uncertain futures, ACP countries, most of which are built and have developed around the production of single commodities such as sugar, are in desperate need of an infusion of short-term economic solutions which can be readily integrated within their policy and legislative frameworks. It is here where the Development Minerals sector could provide an immediate boost.

Table 1: Export dependence in ACP countries

Country	Commodity	Commodity as a Percentage of Commodity Exports, 2012-2013
Sub-Saharan Africa		
Cape Verde	All food items	95
Liberia	Ores, metals, precious stones and non-monetary gold	44
Sierra Leone	Ores, metals, precious stones and non-monetary gold	94
Zambia	Ores, metals, precious stones and non-monetary gold	80
Zimbabwe	All food items	44
Cameroun	Fuels	58
Democratic Republic of Congo	Ores, metals, precious stones and non-monetary gold	83
Namibia	Ores, metals, precious stones and non-monetary gold	66
Angola	Fuels	99
Tanzania	All food items	45
Uganda	All food items	86
Caribbean		
Dominican Republic	All food items	61
Trinidad and Tobago	Fuels	94
Guyana	Ores, metals, precious stones and non-monetary gold	62
Bahamas	Fuels	91
Suriname	Ores, metals, precious stones and non-monetary gold	79
Saint Lucia	All food items	49
Barbados	All food items	63

Belize	All food items	75
Pacific		
Papua New Guinea	Ores, metals, precious stones and non-monetary gold	53
Vanuatu	All food items	96
Samoa	All food items	94
Solomon Islands	Agricultural raw materials	67
Tonga	All food items	79
Timor-Leste	Fuels	98
Fiji	All food items	58

Source: UNCTAD State of Commodity Dependency 2014

For the purposes of this analysis, the Development Minerals sector is comprised of four branches. The first branch, 'construction materials', are, as defined by the British Geological Survey, minerals 'used by the construction industry, for example in road making, in concrete, in house construction and as railway ballast', the largest component being 'aggregates' used on their own or in concrete, mortar, roadstone or asphalt.¹ It may be unrealistic to assume that, even with increased support and the necessary political drive, ACP countries could diversify their export bases through increased production of construction materials. Markets are, at present, saturated, with most countries producing their own construction materials or, on occasion, satisfying a neighbour's demands. The United States, for example, accounts for more than one third of the world's sand and gravel production (52,500 X 1000 t in 2013), most of which is converted into hydraulic fracturing sand and for domestic road and building construction, as well as one quarter of global bentonite (4,950,000 t in 2013), used mostly as a drilling mud or binder in local construction (BGS, 2014). Whilst working toward positioning a Pacific Island nation or African country to supply the US or even European market with such building materials would not be the most viable of development plans, there is no reason why, much like these industrialized regions of the world, they could not be better supported to service local needs. Construction industries are booming – and, by extension, demand for building materials escalating – in a host of ACP countries (Akanni et al., 2014). The exhaustive list includes Nigeria, where in the commercial capital of Lagos, there is an estimated housing deficit of 17 million units (Leke et al., 2014); Kenya, where despite a housing boom in the country capital, Nairobi, addressing the infrastructural deficit will require sustained expenditure of almost US\$4 billion annually over the next decade (Briceno-Garmendia and Shkaratan, 2010); and Papua New Guinea, where, during the height of the development phase of Exxon Mobile's LNG project in 2012, construction contributed 16 percent of national GDP,

¹ 'Construction minerals', <http://www.bgs.ac.uk/mineralsUK/planning/construction.html> (Accessed 12 June 2015).

a figure which plummeted to 8 percent in 2014 at the project's completion but which should ultimately increase once again, in response to the government's recent injection of US\$1.06 billion in spending on infrastructure such as roads, ports, and water treatment and power facilities (Business Advantage, 2014). Whilst procurement policies and support for local operators would need to be addressed moving forward, laying the foundation for a more sustainable construction materials sector would be a viable short-term development strategy in most ACP settings.

The second branch is 'dimension stones', or 'natural rock quarried for the purpose of cutting and(or) shaping to a specific size' (Sutphin and Orris, 2007, p. 677). The main rock types used to fabricate dimension stone are granite, limestone and marble. As explained by Milazzo and Blasi (2003), whilst there is certainly considerable and untapped potential across ACP regions to develop dimension stone industries, to date, there has been very little progress: 70 percent of output in sub-Saharan Africa is accounted for by South Africa and Zimbabwe, although there is a foundation for production in Ghana, Nigeria, Mauritania, Kenya, Sudan, Cameroon, Ethiopia and Eritrea; in the Caribbean, there are some limestone and marble quarries in the Dominican Republic servicing the American and Spanish markets, as well as some potential for Suriname (black and red granites), Jamaica and Haiti (limestone and marble); and in the Pacific, where there is scope to expand coral limestone quarrying in Fiji and massive potential in Papua New Guinea. Given that the use of dimension stone products has grown 7.6 percent annually since 1986 and that most harvested product is used in construction (Ashmole and Motloun, 2008a), there is certainly potential for ACP countries to join the fold. The challenge, however, is the distance most of the grouping's countries are from major markets. As Ashmole and Motloun (2008b) explain, 'the concentration of production has historically tended to be in the countries where the most stone is consumed, and where there has been a long history of use of natural stone in construction, particularly in the Mediterranean and Eastern countries' (p. 36) – headed by Italy, Greece, Portugal, Turkey, China, India and South Korea. A modern quarry and slab-producing beneficiation facility can cost tens of millions of dollars to develop. This, however, may not even be the most significant challenge: the global nature of the sector means that to reach factories, which must offer a wide range of products to their customers, blocks filter their way through a series of intermediaries. But whilst producing for Italy may not be a realistic goal in the short term, as Milazzo and Blasi (2003) explain, 'Regional markets in ACP countries have huge potentials...[in countries] where the building sector is impressively growing due to the recent discovery of large oil fields and the related high circulation of cash money', as well as other markets, which may often be closer and more approachable by ACP operators than the EU and USA markets, for instance the Arabian countries (Saudi Arabia, Oman, UEA, Dubai etc.), the Middle East or the Far East, Japan and Taiwan' (p. 30).

The third branch is 'industrial minerals', which are commodities, single or group, whose 'physical or chemical properties, and not their metallic, energetic or gem properties are the main basis for industrial purposes' (Karlsen and Sturt, 2000, p. 8). Examples include calcium, potash, pumice, calbomite, feldspar, quartz/quartzite, talc, graphite, dolomite and mica. The main consuming markets for these products are, as Table 3 indicates, abrasives, absorbents, agriculture, cement, ceramics, chemicals, construction, oil well drilling, electronics, filtration, foundry, glass, metallurgy, paint, pigments, paper, plastics, refractories, flame retardants and welding (Driscoll, 2004). But as 'manufacturing in ACP countries is an infant industry' (Hoestenbergh and Roelfsema, 2006, p. 4), detailed market analysis is necessary to determine those industrial minerals that can contribute to the growth of local industries.

The final branch is semi-precious stones, which are mineral crystals or rock that are generally cut and polished to make jewellery. The category of semi-precious stones does not include diamond, ruby, emerald or sapphire – the so-called precious stones. Examples of semi-precious stones include quartz, amethyst, garnet, aqua-marine, opal and pearl. Semi-precious stones range in value. Some stones may not be of high enough value to export or facet and instead may service local markets, especially in the vicinity of the tourist industry.

Table 2: Industrial minerals in the household

Product	Mineral(s)
Glass/glasses/ light bulbs	Silica sand, limestone, soda ash, borates, feldspar, lithium
Ceramic tiles/mugs/ plates etc.	Kaolin, feldspar, talc, wollastonite, borates, alumina, zirconia
Paint	TiO ₂ , Kaolin, mica, talc, wollastonite, GCC, silica
Plastic white goods e.g. Fridge, washer	Talc, GCC, kaolin, mica, wollastonite, flame retardants (ATH, Mg(OH) ₂)
Wooden flooring	Treatment materials – borates, chromite
Drinking water	Treatment materials – lime, zeolites
Wine/beer	Diatomite, perlite filters
Salt	Salt
Sugar	Lime in processing
Detergents/soap	Borates, soda ash, phosphates
Surfaces	Marble, granite
Books	Kaolin, talc, GCC, lime, TiO ₂ in paper
Oven glass	Petalite, borates
Heating elements	Fused magnesia insulators
Wallboard/plaster	Gypsum, flame retardants
Metal pots/cutlery	Mineral fluxes & refractories in smelting

Source: Driscoll, 2004

Development Minerals should be distinguished from precious metals and precious stones. This group of high-value, export focused commodities represent the types of 'small-scale mining activities' that have been heavily popularized by the United Nations and donors have both assisted and raised awareness of through an assortment of documents (ILO, 1999; Hentschel et al., 2002; UNECA, 2003) over the years: low-tech, labour intensive activities emphasizing the extraction of alluvial or near-surface hardrock deposits of gold, diamonds, coloured gemstones and, on occasion, non-precious metals such as tin and tungsten. The markets for these commodities, which are among the most tradable and coveted in the world, are dynamic and can be found at all levels, including locally. The challenge facing the UN, EU and partners is that, the little policy 'space' that has been made available for small-scale mining has been for these precious metals and stones. As will be detailed in subsequent sections of this report, this is due to a combination of the economic importance of these activities, specifically how, in most ACP countries, they account for a substantial share of export mineral output, and in some instances, 100 percent of production; increasing coverage of the their environmental and health-related impacts; and how they have come into the spotlight in locations where the main priority is attracting foreign investment to finance the launch of large-scale mineral extraction and exploration projects. Can these frameworks be overhauled, with the view of promoting and developing the DM sector in a more entrepreneurial fashion?

As cases such as Afghanistan (Lamoureux, 2008) and India (Lahiri-Dutt, 2014) aptly illustrate, there is enormous potential for the DM sector to serve as an engine for local economic development. The main hurdle, however, is its formalization, which, as the next section of the report explains, will require navigating, untangling and overhauling a policy machinery that does not acknowledge the sector's importance in the context of local economic development, and which, in cases where it is emphasized, tends to be built around a set of core – largely unfounded – ideas. The implementation of effective capacity-building mechanisms for the sector is contingent upon significant engagement with, and change at, all levels of policymaking.

3. Policy Treatment of the DM Sector

This section of the report will review the policy and regulatory challenges with, and treatment of, DM in ACP countries. It will provide descriptive analysis of the sector's activities, participants and production. The section will trace efforts to formalise activities, highlight the types of institutions involved in regularizing and supporting operators, and present key data on supply chains. The overarching aim of the section is to provide a background on the industry, specifically, a critical overview of the sector's activities and efforts to support and regulate its operators. This section of the report will make the crucial link between the sector's impacts and its largely-informal state – the overarching theme of this report. Legislative frameworks

and donor policies will be reviewed here. The aim, throughout, will be to identify ways in which to improve efficiency and address the sector's problems through networking and improved capacity of associations/chambers of mines and public institutions, as well as donors.

'Small-scale mining' and allied terms are defined differently from country-to-country, according to criteria such as production, plot size, number of employees and level of mechanization (ILO, 1999; Hentschel et al., 2002). Globally, however, the differences between operations are negligible in mineral processing and extraction terms, which is why activities tend to be grouped together. Accurate data on DM, particularly information on production, exports and employment, are scarce, in large part because of the sector's perpetual peripheral position on the international development agenda. Donor agencies, governments and NGOs, therefore, have relied heavily on estimates – the origin of which, at times, has not been publicly disclosed – when designing policies, support interventions and laws for the sector.

In *Small-Scale Mining in the Developing Countries*, a series of descriptive country case studies, including Kenya, Ghana, the Dominican Republic and the Philippines, were presented. Although not particularly detailed, each described the state of small-scale mining in the country profiled but more importantly, broached some very important development themes that have since been critically examined, including the sector's link with agriculture, child labour and its environmental footprint. The oil crisis did push new ideas, such as in-depth investigations into the potential role of small-scale mining in development, to the backburner. But *Small-Scale Mining in the Developing Countries* did, unquestionably, spark enough intrigue to justify the organization of several international gatherings of academics, consultants, and donor, NGO and government officials, at which the role of small-scale mining in development was debated at length. Some critics (e.g. Hollaway, 1991; Jennings, 2003) have since branded these gatherings as futile, as very few tangible contributions to policy emerged from discussions. At each, however, very important ideas were, indeed, debated, including 'ideal' working definitions for small-scale mining, the dynamics of supply chains, and the sector's impact on poverty alleviation – issues which, if adequately addressed, would have undoubtedly raised the sector's profile in international development circles at the time. But this failed to materialize, and therefore, small-scale mining mostly expanded and developed in informal 'spaces'. At a time (the 1980s) when most ACP countries were experiencing structural adjustment,² reform, turbulent political changes and/or debt crises, as well as implementing economic development policies which paved the way for large-scale industrial and agricultural projects, the role of small-scale mining was rapidly changing and its activities were expanding, albeit unchecked.

² Structural adjustment loans are financial packages awarded to borrowing countries in exchange for conditionalities such as privatization of industries, the 'roll back' of the state, the liberalization of agriculture and the revaluation of currencies (Crisp and Kelly, 1999).

Small-scale mining would barely register on development agendas in the 1980s and most of the 1990s. But there were a number of key documents – timely reflections points – which provide enough of a glimpse of the dynamics to draw relevant conclusions. Specifically, whilst the data are questionable, amalgamations of qualitative and descriptive information offer valuable insight on the sector's importance and role in ACP economies at the time. The first was the landmark World Bank publication, *The Mining Industry and the Developing Countries* (Bossom and Varon, 1978). Published prior to the Bretton Woods Institutions' extended period of structural adjustment, the document provides what appears to be a roadmap for mining sector reform in developing countries. It contains no hard data on production and employment but does speculate on where small-scale mining takes place (the details for ACP countries are reproduced in Table 3). One interesting point to note is that the commodities listed in Table 3 largely omit mention of DM, instead focusing on export orientated high-value commodities. Further the study emphasizes mostly negative attributes of small-scale mining, which research (e.g. Hilson, 2013) has since shown to be 'expressions' of the sector's informality, stating that 'The problems of small-scale mining are nine' (p. 262): excessive fragmentation of the land that inhibits rational exploitation; poor recovery; inadequate infrastructural facilities; high costs of inputs and marketing; challenges with collecting data and monitoring; their requirements for large administrative staff; poor health and working standards; and challenge with policing. Perhaps most significantly, it acknowledged that, despite these challenges, the sector is important economically, and therefore has a role to play in development:

Such mining is generally characterized by labor intensive and inefficient work methods, inefficient exploitation of deposits, substandard work conditions, poor management, and undependable output. Nevertheless, small-scale mining can make an important contribution to the economy-if not of the country, of a province-by providing employment, very often in remote areas with no alternative sources of employment. [264]

This is why, the document further argues, 'special attention [is required] when formulating policies and drafting mineral and fiscal legislation, when staffing the ministries, and when preparing a mining sector development plan'. The problem, however, is that not enough effort was made to create a necessary policy 'space' for the small-scale mining at a time when foreign-financed large-scale mining and mineral exploration projects were rapidly expanding in most ACP countries.

Table 3: A glimpse of small-scale mining in selected ACP countries, 1960-1970

Country	Mineral(s) Subject to Small-Scale Mining
Africa	
Algeria	Antimony, barite, bentonite, diatomite, mercury, zinc
Central African Republic	Diamonds, gold

Ethiopia	Gold, manganese, platinum
Gabon	Gold
Ghana	Diamonds, gold
Kenya	Beryl, copper, gemstone, gold, silver, vermiculite, wollastonite
Lesotho	Diamonds
Liberia	Diamonds, gold
Madagascar	Bismuth, colombite, old, rare earth minerals, tantalite
Morocco	Antimony, barite, lead, manganese, tin, zinc
Nigeria	Asbestos, barite, colombite, gold, lead, tantalite, tin, zinc
Rhodesia	Antimony, beryl, chromite, copper, gemstones, gold, lithium, manganese, mica, silver, tantalite
Rwanda	Beryl, gold, tin, tungsten
Sierra Leone	Diamonds
Tunisia	Lead, mercury, zinc
Tanzania	Diamonds, gold, magnetite, mica, precious stones, tin, tungsten
Uganda	Beryl, bismuth, tungsten
Asia Pacific	
Burma	Antimony, manganese, tin, tungsten
Malaysia	Barite, iron, manganese, tin, tungsten, zinc
Caribbean	
Cuba	Copper, manganese, pyrite
Dominican Republic	Gold

Source: Adapted from Bossom and Varon, 1978

This issue would not be picked up on at the next critical juncture, however, which took place toward the end of the 1980s, following publication of *Small-Scale Mining: A Review of the Issues* (Noetstaller, 1987), a report commissioned by the World Bank. A seminal document in its own right, *Small-Scale Mining: A Review of the Issues* compiled estimates of production and employment, based on miscellaneous unpublished documents, statistical compilations and conference proceedings. Adopting a production threshold of 100,000 tonnes per annum, Noetstaller (1987) estimated that small-scale mining accounted for 12 percent, 31 percent, 20 percent, 10 percent and 75 percent of global production of metals, industrial minerals, coal, diamonds and gemstones, respectively. On the issue of employment, the document implies that it has a profound effect on poverty alleviation, arguing that 'Data presented illustrate that SSMs can contribute significantly to national employment objectives, reducing unemployment and underemployment primarily in rural areas, thus helping to control rural-urban migration'. It furthermore explains that 'Labor intensity is particularly great in VSSM

[very small-scale mining] operations of artisanal mining districts, where engagement in mining is frequently intermittent in accordance with seasonal work in agriculture' (p. 14). This is an issue which, as will be explained in Section 4.1 of this report, has since been explored in considerable depth by a host of academics.

But these issues must be viewed in the wider context of Noetstaller's (1987) main message and ultimately, its most significant impact: legitimizing small-scale mining's treatment in policy as a business enterprise and in a similar fashion to large-scale counterparts. Passages such as 'mining operations, regardless of size, offer an excellent opportunity for transforming unskilled labor into semi-skilled or skilled industrial labor' (p. 14), and repeated use of phrases such as 'entrepreneurship and business development' and 'small enterprise' are testament to this position. The argument resonated with the World Bank, which was working diligently at the time to overhaul legislation and investment policies in countless developing countries, with the aim of transforming mining into an export-led sector. Failure to sufficiently protect small-scale mining, specifically by carving out a 'space' for it in policy and guaranteeing the support it needed to flourish locally at a time when donors and host government were mostly preoccupied with attracting foreign investment, has proved catastrophic for the sector's development. This is particularly the case with aggregates, which, as Langer et al. (2004) explain, 'Unlike metals, such as gold, that have a high unit value derived from their special properties and relatively low abundance, aggregate is a high-bulk, low unit value commodity' and therefore 'derives much of its value from being located near the market and thus is said to have a high "place value"' (p. 8). Of the 47-59 billion tonnes of material mined every year, sand and gravel account for the largest share (68-85 percent) and the fastest extraction increase (Peduzzi, 2014). A country such as the United States offers valuable insight on the importance of a vibrant industrial minerals sector. Here, a total of 812 million metric tonnes of sand and gravel was produced in 2012, feeding a perpetually-expanding construction industry. Sand and gravel is the second largest nonfuel mineral commodity in the United States in both volume and value, with contributions from an estimated 4000 companies from 6400 operations in 50 states (Langer, 2005; Bolen, 2012).

The domestic quarrying and aggregate extraction industries in ACP countries, however, have suffered from acute undercapitalization. Nigeria, for example, is unable to satisfy the insatiable demands of its booming construction industry, particularly fresh housing developments in Lagos, and must import aggregates (Kayode and Olusegun, 2013; Akanni et al., 2014). Similarly, in Rwanda, where rapid industrialization has also occurred over the past 10-15 years, in a revitalized mining sector mostly engaged in tin, tungsten and tantalite extraction, a large share of its imports are construction materials and fertilizers – to the tune of US\$150 million in 2008 – despite possessing 'the raw materials necessary to procure locally a proportion of these existing imports' (Government of Rwanda, 2009, p. 18). One of the more extreme cases is the Pacific island nation of Kiribati, which is also one of the

poorest countries in the world. A report (Greer Consulting, 2007) recently commissioned by the EU revealed that although the government and locals mine aggregates from beaches and tidal flats, the quantity and/or quality of the aggregates sourced are not always sufficient to meet the demand from donor-funded projects; in other cases, donor organizations refuse outright to use locally-procured aggregates because of environmental and safety concerns. Notably, during the two-year period prior to the report's publication, the Japanese reportedly imported 600 containers of aggregate from Fiji to upgrade the Beito port, as well as for a power station and water supply project. The experience of Kiribati underscores the challenge which most ACP countries with potentially-vibrant small-scale industrial mineral economies face: the inability to produce quality product and enough of it. Whilst each country has its own standard for, say, Portland cement, the United States and the European Union follow their own specifications – a standard prepared by the American Society for Testing and Materials-ASTM C-150 Standard Specification for Portland Cement, and guidelines devised by the European Cement Association, respectively³ – which most cash-strapped ACP countries will struggle to meet.

The next key 'points of reflection' took place in the 1990s, a decade when UN engagement in small-scale mining issues rapidly intensified, a change that is discernible from the literature produced at the time. The wheels were set in motion in Harare in February 1993, where a weeklong seminar, 'Guideline for Development of Small- and Medium-Scale Mining', hosted by the United Nations Department for Economic and Social Affairs, was held, at which international experts met to critically 'rethink' small-scale mining's potential role in development. Officials at the UN were instrumental in organizing the event, and would continue to play a catalytic role in mobilizing donors, consultants, and governments to engage more reflectively in discussions on small-scale mining's economic and social importance. The adopted Harare Guidelines provided a much-needed blueprint for the development of small-scale mining; attendees were in broad agreement these guidelines were key to facilitating a positive, long-term impact in the sector (Labonne, 1994).

Estimates of, *inter alia*, production and workforce size began to surface, although again, the origin of most of the data remains unclear. Of particular concern was the rather cavalier usage of the latter, figures which have been recycled repeatedly over the years: most ACP countries have never carried out a comprehensive survey of their small-scale mining workforces. Drawing on an assortment of estimates – themselves, in many cases, retrieved from additional sources – UN officials projected, in the mid-1990s, that there were six million people employed directly in small-scale mining, and assumed there to be a significant multiplier effect, arguing that 'if it is assumed that there are on average four additional family members

³ See 'Concrete Details', www.armca.ca/the-universal-international-specification-for-portland-cement (Accessed 13 May 2015).

per worker, which is a conservative assumption, then over 30 million people depend on artisanal and small-scale mining for their livelihood' (UN, 1996, p. 216). In the 1990s, officials at the World Bank also began to speculate on the sizes of small-scale mining workforces in a number of locations where the organization had launched extractive industries development projects. For example, it was declared (World Bank, 1995) that there were 30,000 small-scale miners operating in Ghana at the time, although these data were extracted from an earlier report (World Bank, 1992) which, itself, had reproduced the data from Noetstaller (1987). Officials also reported at the time that in Tanzania, 'at least about 100,000 small-scale miners are estimated to be engaged in gold and gemstone mining, using artisanal methods of extracting, concentrating and recovering minerals', although it was correctly recognized that 'no accurate data are available' (World Bank, 1994, p. 4). Yet, donors, host governments and NGOs seemed content with using such unfounded and recycled census data, which, as has been widely reported, have undermined a number of promising interventions aimed at supporting and/or formalizing small-scale mining (ILO, 1999; Hentschel et al., 2002; Hilson, 2007). These figures, however unreliable they may have been, would continue to inform policy up until publication of the ILO's landmark report, *Social and Labour Issues in Small-Scale Mining* (ILO, 1999), which presented revised estimates of 11.5-13 million and 90-100 million, respectively. The extent to which this study included the commodities that make up the DM sector is unclear.

Perhaps more importantly, Harare served as an important primer for the landmark *International Roundtable on Artisanal Mining*, a World Bank-hosted seminar held in Washington DC in May 1995 (Barry, 1995). On the one hand, having the World Bank – the world's largest multilateral donor with lengthy involvement with extractive industries and development – on board was key, and certainly a testament to the UN's influence and ability to mobilize key actors capable of influencing the developmental trajectory of small-scale mining. The *Roundtable* was a landmark event, at which novel ideas about small-scale mining, including the view that the sector is largely poverty-driven, an integral component of countless rural societies and at times, carried out seasonally alongside farming, were debated for the first time. Only an organization with the reach and influence of the World Bank could realistically change policy to better reflect these fresh discussions. On the other hand, the Bank, which had implemented and was in the process of launching a range of mining sector reform projects, was helping host governments redraft policies with the aim of facilitating increased investment in *large-scale mineral extraction and processing* – clearly a conflict of interest. A number of forward-thinking scholars reflected on the importance of creating a sizable 'space' in policy at a time when the Bank was preoccupied with reactivating industrial-scale mining projects and operationalizing this blueprint of export-led mineral development to ensure that stated objectives concerning small-scale mining – specifically its formalization and the delivery of appropriate support to its operators – were adequately fulfilled. Davidson (1993) was one of the more vocal critics, arguing that 'Governments must be prepared to move beyond the

establishment of legal frameworks, to identify deposits and areas amenable to small-scale development, including the preliminary evaluation of their technical and economic viability at different levels of operation' (p. 317). Failure to do so, however, meant that regulatory apparatuses launched for small-scale mining would take on a character of their own and, perhaps more significantly, reflect the Bank's broader objectives concerning mining. Most policies and laws implemented for the sector, therefore, have been grafted on to or built into existing/planned legislation for large-scale mining.

But the efforts made by the UN to raise awareness of small-scale mining's livelihoods dimension at international plenaries in Harare and Washington, as well as in 2002 in Yaounde, Cameroon, were largely in vain because the donor community had failed to create the necessary 'space' in policy to empower and adequately support the sector's operators. As will be explained, failure to do so has spawned a small-scale mining policy agenda constructed using inadequate data and which has galvanized around a number of largely-unfounded beliefs. For DM to gain more traction on the development agenda, the UN, EU and project partners must work to unravel these policies, with the aim of creating this much-needed 'space' for the sector and, by extension, more appropriate, 'operator-friendly' regulatory frameworks. This requires first understanding the unique context in which most small-scale mining legislation and formalization strategies have emerged over the past three decades.

4. Formalizing the Development Minerals Economy

4.1 Antecedents

No longer able to ignore small-scale mining due to its widespread occurrence and growing recognition of its economic importance, policymakers in ACP countries, with the backing of donors, have worked to formalize the sector's activities. The debate on the formalization of small-scale mining has gained considerable traction in the past decade in particular (Siegel and Veiga, 2009; Hilson and Maconachie, 2011), and is now seen by donors and host governments as a key to stimulating the growth and development of a robust, efficient and supported sector. Momentum began to build in the mid-1990s, by which time, the 36 countries in sub-Saharan Africa alone had in place rigid policy frameworks and legislation with the aim of formalizing small-scale mining, and/or which had established sector-specific administrative and technical institutions to facilitate this move or were in the process of doing so (Fisher, 2007). A number of Pacific and Caribbean countries were also working toward formalizing small-scale mining at this time. In Papua New Guinea, the *Mining Act*, 1992, gave greater recognition to customary landowners, permitting them 'to conduct non-mechanised alluvial mining on their land without the need to obtain a registered lease', as well as 'created a type of lease – the Alluvial Mining Lease (AML) – which has a maximum size of five hectares and is restricted to customary landowners' (Moretti, 2007, p. 7). In Guyana, permitting rules for

small, medium and large-scale mines were included in the country's *Mining Act* of 1989, which took effect in 1991 (Lowe, 2006). Table 4 provides an overview of the regulatory frameworks for small-scale mining, and corresponding regulatory agencies, in selected ACP countries.

Table 4: Regulatory and Institutional Frameworks for mining and quarrying in Selected ACP Countries

Country	Key Legislation/Permits/Licenses	Regulatory Agency
Dominican Republic	<ul style="list-style-type: none"> • Mining Law No. 146 (1971) and regulations (Dominican Mining Law) • Resolution No. 207-98 (1998) • Law No. 50 (2010) • Decree No. 839-00 (2000) • Decree No. 947-01 (2001) • Law No. 123-71 • General Environmental and Natural Resources Law No. 64-00 	<ul style="list-style-type: none"> • Mining General Directorate • Ministry of Energy and Mines
Fiji	<ul style="list-style-type: none"> • Fiji Chapter 146: Mining Act & Regulations • Fiji Chapter 147: Quarries Act & Regulations • Fiji Chapter 148: Petroleum (Exploration & Exploitation) Act & Regulations • Fiji Chapter 189: Explosives Act & Regulations • Laws of Fiji Chapter 149: Continental Shelf Act & Regulation 	<ul style="list-style-type: none"> • Mineral Resources Department • Mines Section and the Mines Inspectorate
Guyana	<ul style="list-style-type: none"> • Mining Act 1989 	<ul style="list-style-type: none"> • Guyana Geology & Mines Commission
Suriname	<ul style="list-style-type: none"> • Mining Code of 1986 (Decree E 58, 1986) • 1989 State Decree (No 38) • 1919 De Bauxiet Wet 	<ul style="list-style-type: none"> • Suriname Ministry of Natural Resources and the Geology and Mining Department
Papua New Guinea	<ul style="list-style-type: none"> • Mining Act 1992 • Mining Safety Act and Regulations 2007 • Environment Planning Act 1978 • Water Resources Act 1982 • Central Banking Act and Regulations 2000 • Lands Act 1996 • Customs Tariff Act 1990 	<ul style="list-style-type: none"> • Mineral Resources Authority (MRA) of Papua New Guinea
Uganda	<ul style="list-style-type: none"> • Mining Act 2003 • Mining Regulations 2014 • Mineral Policy of Uganda 2001 	<ul style="list-style-type: none"> • Commissioner of the Department of Geological Survey and Mines • Ministry of Energy and Mineral Development,
Tanzania	<ul style="list-style-type: none"> • Tanzanian Mineral Policy 2009 • The Mining Act, No 15 of 2010 • Environmental Management Act, 2004 • Income Tax Act, 2004 • Tanzanian Investment Act 1997 	<ul style="list-style-type: none"> • Ministry of Energy and Minerals

In most cases, however, it has been the approach taken to formalize activities which has been responsible for spawning the industry seen today – environmentally-degrading, plagued with endless health, safety and social concerns, and confined to an informal ‘space’. As explained in a recent report published by the United Nations Environment Program (UNEP, 2012a), three general approaches can be taken to formalize small-scale mining: 1) development of new legislation specific to the sector within mining codes, environmental, health and safety, trade, tax and other legislation, in cases where the sector is extra-legal (neither currently governed by law nor considered illegal); 2) reform of existing and development of new legislation specific to the sector, environmental, health and safety, trade, tax and other legislation, in cases where small-scale mining is illegal; and 3) reform of existing legislation specific to small-scale mining, in cases where current law and regulation does not address the particularities of the sector appropriately. Whilst options 1 and 2, tasks which both require a fairly sizable amount of analysis of the sector’s dynamics, are most likely to yield ‘best practice’ regulations and policies that reflect more accurately the realities on the ground, most ACP governments have pursued option 3. Typically, in such cases, countries have revived or reworked definitions of ‘small-scale mining’, ‘artisanal mining’ and/or ‘medium-scale mining’, and then included these in ‘reformed’ legislation. This leads to the first unique attribute of the context in which policies and laws have been introduced: the timing.

Donors and host governments have undeniably shown considerable enthusiasm with formalizing small-scale mining over the years but most such moves have taken place during the latter stages of broader reform, a direct result of the low priority placed on the sector’s needs in policy. A quick glance at the wave of mining sector reform efforts in ACP countries in the 1990s reveals that for the most part, attention was paid to formalization of small-scale mining only *after* laws and economic policies were overhauled for large-scale extraction and processing, which, again, sought to bolster activities through foreign investment. For example, in Ghana, the *Small-Scale Gold Mining Law* was implemented in 1989, a full three years after the country implemented its legislative centrepiece of mining sector reform, *The Minerals and Mining Law*. In Tanzania, where the 1998 Mining Act was passed with the aim of bolstering large and medium-scale mining as an economic strategy, ‘leading to many large tracts of land being allocated to larger companies’, it was not until 2005 that the government recognized the need to balance the livelihoods of artisanal miners with commercial mining, and began to act accordingly (UNEP, 2012b, p. 5). The Dominican Republic, long a popular destination for large-scale gold mining, does not even have in place a law specific to small-scale mining, and has only recently begun to organize operators into cooperatives. In fact, here, small-scale mining has been neglected so much so that 2014 was declared ‘The Year of Small-Scale Mining’, which saw the government appoint a professional to the Mining General Directorate to focus on the sector’s issues (Keller et al., 2014). As will be explained, this significant oversight has had the effect of confining the sector to an informal ‘space’.

On the surface, this may not appear to be the case. Significantly, most World Bank mining sector reform projects launched to date, particularly those implemented in sub-Saharan Africa, have featured fairly sizable small-scale mining components. A stated objective in a number of cases has been to formalize the sector, support its operators, and to strengthen the regulatory agencies needed to make this possible. In the case of Tanzania's *Mineral Sector Development Technical Assistance Project* (World Bank, 1994), for example, a stipulated aim was 'improving productivity and environmental and social viability of artisanal and small-scale miners' (p. ii). Similarly, a minor objective of Ghana's *Mining Sector Environment and Development Project* (World Bank, 1995) was to provide 'Assistance to Small-Scale Mining Enterprises' (p. iv). But it would be naïve to believe that these moves were made strictly to support the sector. The overarching goal of mining sector reform is, in every case, to open mineral economies to foreign investment and usher in a blueprint of export-led growth. Thus, and to reinforce points already raised, as very little was done in the early stages of reform to carve out a 'space' in policy for small-scale mining, including earmarking the necessary resources for formalizing activities, the DM sector in particular, with its emphasis on commodities mined for domestic use, was side-lined in favour of commodities attractive to international investors.

Projects such as Papua New Guinea's US\$10 million *Mining Sector Institutional Strengthening Technical Assistance Project* (World Bank, 2000) 'does not include a small-scale mining component' (p. 13) in all likelihood because it was not seen to be necessary at the time of its drafting to fulfil its main objective, which was 'to strengthen institutional capacity within the Department of Mining (DoM) and the Internal Revenue Commission (IRC) to administer and regulate exploration and mining projects and to thereby contribute to socially and environmentally sustainable private mineral investment in the Papua New Guinea (PNG) mining sector' (p. 2). In the cases of aforementioned projects launched in Tanzania and Ghana, substantial sums of money were pledged to support small-scale mining but these components were, quite clearly, 'add-ons' to the projects themselves, the vague, overly-ambitious and unrealistic objectives set reflecting a poor understanding of the sector's dynamics. This is particularly evident in the former's project document, which states that 'The principal objective of the project is to support Tanzania's private sector-oriented mining development policy and to expand private investment in mining. The secondary objective is to strengthen this capacity of mining institutions to efficiently administer and regulate the sector'. The project also commits to 'improving productivity and environmental and social viability of artisanal and small-scale miners' (p. iii). It is also fairly evident in the latter, the overall objective of the project being 'to support the development of Ghana's mining sector on an environmentally sound basis through strengthened mining institutions and the provision of appropriate technology and organizational support to small-scale miners' (p. iii). Even in the case of Nigeria, which could be considered a 'success story,' given the considerable work undertaken with funding from the US\$127 million *Sustainable Management of Mineral Resources*

Project (World Bank, 2012), outcomes and results must be put into context. Whilst 'economic development and livelihood diversification in Artisanal and Small-scale mining (ASM) areas' was identified as one of the project's primary objectives, the bulk of its goals revolved around the large-scale mining economy, namely, the strengthening governance and transparency in mining; private sector development; and project coordination and management. The achievements made on the small-scale mining front, including formalizing 250,000 operators, equipping 12,000 with grants, and providing 3000 with training, were likely magnified by other failures, particularly the lack of success with facilitating foreign investment in large-scale mineral exploration and extraction.

In the absence of a vibrant dialogue capable of buoying and building on the momentum generated by the UN's efforts to address the livelihoods dimension of small-scale mining, the DM sector has been pushed down an unsustainable and undesirable development path. Specifically, and as indicated, through reform, the World Bank has sought to transform mining into an export-led sector propelled by foreign investment. Without the requisite planning, however, the DM sector, despite chiefly servicing local markets, being low-tech and not necessarily competing with large-scale operators for reserves, has, perhaps inevitably, not been included in this discussion. The ramifications of the sector's current growth trajectory in ACP countries will be examined shortly but before doing so, it is instructive to touch on the second and third unique attributes of the context in which policies and laws were launched.

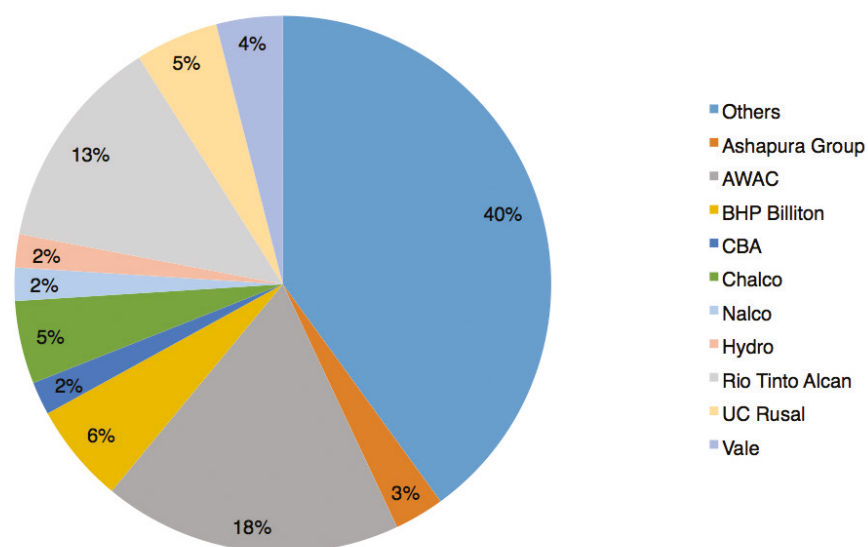
The second attribute is that it appears that the impetus to formalize small-scale mining was mainly the perceived environmental, health and safety concerns. Donors and host governments seemed overwhelmed by the sector's fairly sizable environmental footprint, and the host of social ills in producing communities, although crucially, few have linked impacts to the informality of operations. Most of the project documentation that emerged at the time, therefore, tended to highlight – at times, overzealously – these impacts, in the process painting an incomplete picture: there was no recognition that these complications have arisen largely because of the sector's confinement to informal 'spaces', a glaring oversight which, as will be explained, has adversely affected how the sector is regulated. This could explain why these documents, despite acknowledging the economic importance of small-scale mining, seem unclear as to where the sector should feature in the economic development plans and strategies of ACP countries, and are ambivalent overall on the issue of formalization. The specific message conveyed is that small-scale mining *should* be formalized, but by using a 'stick and carrot' approach (rewarding licensees and persecuting those who fail to register their operations), which aligns with the broader sectoral reform 'vision'.

Perhaps the singling out of environmental and allied concerns in small-scale mining was deliberate on the part of the architects of reform, who were possibly fixated on ushering in their blueprint of large-scale extraction and development at all costs. One of the few exceptions – and not an ACP country – was the Philippines, where, in a comprehensive review of mining

in the country (World Bank, 1987) published by the World Bank, it was concluded that ‘Small-scale mining is an important source of employment in rural areas as well as a small but significant source of gold production...[that] small-scale gold mining is reported in over twenty locations and is estimated to provide employment for over 200,000 miners – with each miner having an average of four dependents who also directly benefit from small-scale mining’ (p. iii). But these, and other, promising – yet, isolated and disconnected – efforts made to draw attention to the importance of small-scale mining’s livelihoods dimension (Labonne, 1994, 1999; Jennings, 1994) have had little traction in a policy dialogue which, by the turn of the century, was fixated on the sector’s adverse environmental, health and social aspects, and its predominantly ‘illegal’ character. Even the flagship UNIDO Global Mercury Project, which, despite its many shortcomings, cast very important light on small-scale gold mining’s social dimension and underlying causes of mercury pollution, is, rather unjustly, mostly remembered for drawing attention to what is now perceived to be a severe environmental problem. An initial challenge for the UN and European Union, therefore, is *disassociating* small-scale mining with solely environmental, health-related and social impacts and unravelling a policy agenda built largely around these ideas.

The third and final attribute concerns the policy treatment of industrial minerals, industrial metal ores (e.g. iron ore and bauxite) and aggregates: this category is virtually absent from the small-scale mining development agenda. There appears to be two reasons for this, the first being that, under reform, this category of mining has been increasingly emphasized by donors as an area for large-scale extraction and development. Judging by the series of donor-led projects that surfaced in this area during the 1980s and 1990s, this perception – the view that extraction of industrial minerals and aggregates should be a domain of large-scale mining – had a profound impact on development strategy in ACP countries and elsewhere. Key examples include Madagascar’s Ilmenite Mining Engineering Project (World Bank, 1994) and Jordan’s Shidiya Phosphate Mine Project (World Bank, 1995). These, along with various IFC investment forays, including in the likes of Guinea’s bauxite economy and iron ore exploration in Mozambique, were telling signs of donors’ views on this segment of the mining sector: that it should be reserved for large-scale players. The thinking remains the same, and the current orientation of markets pose a formidable challenge to those who wish to pursue a radically different strategy. This becomes clear when examining commodities such as phosphate and bauxite mining more closely, both of which, as Table 5 and Figure 1 show, respectively, continue to be dominated by a small group of multinational players that have no doubt benefited immeasurably from the ‘large-scale bias’ of donor strategy in this area. Because of the orientation of development policy, countries such as Malawi and Fiji, which boast vibrant small-scale industrial minerals and aggregates industries, are unlikely to receive much support from donors to bolster their industrial minerals sector.

Figure 1: Bauxite producers, 2013



Source: Nappi, 2013

Table 5: Controlling Companies in Phosphate Rock Mining, 2008

Rank World 2008	Company Name	Country	Controlled Production 2008 (Mt)	Share of World 2008 (%)	Cumulative Share of World 2008 (%)
1	State of Morocco	Morocco	24.9	15.47	15.47
2	Mosaic Co, The	United States	16.9	10.48	25.95
3	State of Tunisia	Tunisia	8.0	4.97	30.92
4	Potash Corp of Saskatchewan Inc.	Canada	7.1	4.38	35.30
5	State of Jordan	Jordan	6.3	3.89	39.19
6	Bunge Ltd	United States	3.3	2.02	41.21
7	General Co for Phosphates and Mines	Syria	3.2	2.00	43.21
8	CF Industries Inc.	United States	3.1	1.94	45.15
9	Israel Chemicals Ltd	Israel	3.1	1.92	47.07
10	State of South Africa	South Africa	2.3	1.42	48.49
11	Incitec Pivot Ltd	Australia	2.0	1.24	49.73
12	JR Simplot Co	United States	2.0	1.24	50.97
13	Agrium Inc.	Canada	2.0	1.21	52.18
14	State of Algeria	Algeria	1.8	1.12	53.30
15	Yara International ASA	Norway	1.2	0.74	54.04

16	Monsanto Co	United States	1.0	0.62	54.66
17	State of Togo	Togo	0.8	0.50	55.16
18	Anglo American plc	United Kingdom	0.7	0.45	55.61
19	State of Senegal	Senegal	0.7	0.43	56.04
20	Elko Chemicals Inc.	United States	0.3	0.16	56.20
21	State of Nauru	Nauru		0.03	56.23

Source: *Raw Materials Group 2010*

The second reason concerns the ‘narrowness’ of the policy focus on small-scale mining itself. Under reform, within what little space has been devoted to it, there has been a tendency to link small-scale mining to particular commodities whilst simultaneously disassociating it with others. This has spawned formalization processes that have been built around one commodity. In Papua New Guinea, for example, licensing for and formalization of small-scale mining is linked exclusively to gold and regulation of activities in the country’s 17 established gold fields, despite the existence of a range of other minerals, including copper, rare earth elements, nickel, cobalt, chromium, molybdenum, iron and platinum. As indicated, the small-scale mining sector is recognized in the *1992 Mining Act*, the main piece of legislation governing mining in the country (Moretti, 2007). It is clear, however, that its design was informed almost entirely by experiences in the alluvial gold mining sector. The AML is restricted to plots of five hectares or less and can only be undertaken within 20 metres of river courses, restrictions that have clearly been imposed specifically to control the country’s small-scale gold mining activity.

Two of the more obvious examples are Tanzania and Ghana, where licensing procedures for small-scale mining have also been informed exclusively by gold extraction and processing. In the case of the former, the government has prioritized gold so much so in its efforts to legalize small-scale mining that it has become one of the first countries to issue Processing, Smelting and Refining Licences on a small-scale, a sign of how dynamic the sector has become (Jönsson and Fold, 2014). In Ghana, small-scale mining was considered ‘legalized’ following implementation of the *Small-Scale Gold Mining Law* in 1989 (Hilson and Potter, 2005) which, understandably, has led decision-makers to treat ‘small-scale mining’ synonymously with ‘small-scale gold mining’. A host of other ACP countries that have worked toward formalizing their small-scale mining economies have been informed heavily by experiences in one sector, including Sierra Leone (diamonds), Liberia (diamonds), Burkina Faso (gold), Suriname (gold), and Zambia (emeralds). In each of these countries, however, there is a considerable Development Minerals sector that exists; scope for diversifying the commodities that are extracted on a small scale; and opportunity to develop these industries for local people to alleviate significant hardship. But the tendency to ‘associate’ small-scale mining with one commodity during the early phases of reform has had a profound impact

on regulatory and formalization approaches, influencing everything from licensing to geo-prospecting strategies. This has, rather inevitably, led to the prioritization and support of mining activities emphasizing the extraction of a particular precious metal or stone, typically at the expense of DM. The lesson here for ACP countries which are still in the process of formalizing small-scale mining, such as Malawi and the Dominican Republic, is to ensure that laws and regulations are as encompassing as possible, and have application to the full complement of minerals being extracted on a small scale.

In sum, for DM to garner more attention on the development agendas of ACP countries, the UN, EU and partners must disentangle a policy machinery that has been shaped by unfounded biases, often to the detriment of the sector's wellbeing.

4.2 The Policy Framework

Whilst an exhaustive discussion about the regulatory and formalization structures in place for small-scale mining and their antecedents may seem unnecessary, it does help to cast light on the policy context in which the UN, EU, ACP and partners find themselves working. As will be explained in this section of the report, a rather precarious launch pad has spawned – relatively unquestioned – policies, laws and formalization structures which, in many cases, do not accurately reflect the realities on the ground. Amending these, and garnering DM its rightful spotlight on the ACP development agenda will require identifying the key pressure points in policy and responding accordingly. As it stands, the regulatory and policy frameworks in place for DM have had the effect of *informalizing*, as opposed to regularizing, activities. An analysis which explores, against the background of this informality, the problems which are today commonly associated with small-scale mining, the benefits it provides, and the dynamics of its organizational structures, therefore, promises to yield a more accurate assessment of the sector and offer important clues on the magnitude of the work needed to facilitate it getting the support it needs.

Whilst precise data are unavailable, all signs point to the vast majority of small-scale miners worldwide operating without the requisite permits. But why is this the case? The overarching problem, which stems from a poor understanding of local-level dynamics and has ultimately led to the abovementioned biases misinforming the design of formalization structures and laws, concerns the policy treatment of small-scale mining. For ACP countries, two documents have particular resonance here, each of which casts light on the policy 'mindset'. The first is *A Strategy for African Mining* (World Bank, 1992), which calls for small-scale mining and large-scale mining to be treated on equal terms:

Much of the mining legislation enacted in African countries since independence envisages that 'small-scale mining' will be reserved for citizens or local companies while 'large-scale mining' will be the province of state mining corporations or large foreign mining companies...There is no good reason to create differential access to mineral rights for different classes of mining investor. A state mining enterprise should compete on the same terms as a privately-owned company, foreign on the same terms as national, large companies under the same broad rules as small ones. [p. 22]

The second, *A Mining Strategy for Latin America and the Caribbean* (World Bank, 1996), claims that 'The Artisanal Mining sector is the most problematic', that 'It is generally neglected by government and decried by environmentalists but will not go away', and therefore 'They [operations] should be subject to the same laws and regulations, given title to their claims, and made responsible for their activities' (p. 61). These views went a long way toward reinforcing the prevailing perception at the time, as conveyed initially in several influential reports and the literature (e.g. Alpan, 1986; Noetstaller, 1987; Noetstaller, 1994), about small-scale mining: that its participants are 'wildcat' operators and rogue entrepreneurs who cannot be regulated.

This view has long shaped the design of regulatory, policy and permitting frameworks for the small-scale mining in countless ACP countries. This has had the effect of creating an unnecessary layer of bureaucracy and formidable financial barrier in the formalization of an industry which research (e.g. Hilson and Potter, 2005; Banchirighah, 2006) has since shown is largely poverty-driven, populated not only by enterprising businessmen but also individuals from all areas of society who have struggled to secure employment elsewhere. Today, the gap between what policymakers are attempting to regulate on the one hand, and what the small-scale mining actually is – namely, its composition in terms of the diversity of the commodities its operators extract and the eclectic range of activities which comprise it – on the other hand, remains sizable. Specifically, in addition to there being a design problem – licensing and policy apparatuses for small-scale mining being built around a particular commodity – there is also a very crucial misinterpretation stemming from calls to treat small-scale mining and their large-scale counterparts equally in policy. This has spawned a series of inappropriate licensing and formalization apparatuses for the former, which a galvanizing rhetoric and burgeoning body of research findings that point to the sector being poverty-driven and for policy to reflect this have failed to change. Policymakers seem unwilling to abandon the entrepreneurial foundation on which so much of the regulatory and formalization foundation is built. Moving forward, therefore, the UN, EU, ACP and partners will need to tackle a number of cases which this crucial oversight has spawned.

The first set of cases are situations characterized by prohibitive licensing costs, which prevent prospective permit holders from legitimizing themselves in the eyes of the law. Officials at the UN, specifically the ILO, were among the first to identify this:

Small-scale mining is bedevilled with too many regulations that are mostly designed to constrain it and too few inspectors to ensure that they do. There is therefore little incentive for small-scale mines to conform, particularly if the risks of being caught and of sanctions being applied are minimal. If small-scale mining is to be encouraged to operate legally, legislation must be (at least) even-handed in allowing small-scale miners access to suitable land for prospecting and mining activities. It must be “user friendly” as far as the issuing of permits and the granting of licences are concerned – permits that provide clear security of tenure for a reasonable period so that small-scale mining can become established. [ILO, 1999, np]

Several studies have been carried out which reinforce these claims, exploring how permit/license costs pose a barrier to formalization. Focusing on alluvial diamonds, Hinton et al. (2010) projected, based on a population size of 60,000 miners, that a US\$5 licensing fee could lead to the legalization of 82 percent of the workforce. Their findings point to how in ‘high performing’ countries or locations with high levels of formalization, such as Guyana, ‘licensing costs were in line with miners income’ (p. 11). The closest case in sub-Saharan Africa is perhaps Mozambique, where a mining pass can be obtained for only US\$40.

There are many important lessons to be learned from Guyana, one of few countries where, as explained, small-scale mining is a focal point of national development and, by extension, cost is not ‘made’ a barrier to formalization. Here, prospective permit holders first obtain a prospecting license, for an affordable US\$5, and then have 60 days to pay the US\$10 rental, after which they will be issued a notice of verification. The applicant then has six weeks to have the claim verified by an officer and to submit the report to the head office of the Guyana Geology and Mines Commission (GGMC) in the country capital of Georgetown. In both Guyana and Liberia, permits must be renewed annually but importantly, can be done so indefinitely, providing operators with much-coveted security of tenure. The Liberian Government, however, requires individuals interested in engaging in mechanized activities to hold a Class B License, which costs US\$5000 (Van Bockstael, 2014), a fee that is beyond the means of most citizens. In Ghana, the costs of securing a small-scale gold mining license are equally prohibitive; moreover, applications can take many years before a decision is reached (Hilson et al., 2014).

Yet, despite the valuable lessons offered by Guyana, and the mounting evidence which points to cost inhibiting the formalization of small-scale mining in ACP countries, host governments have continued to stand by their regulatory and licensing frameworks. This position is even more inexplicable when considering that the governments of these very countries have conceded, at international plenaries (Barry, 1996; Aryee et al., 2003; UNECA, 2003), that small-scale mining is ‘poverty-driven’. It is imperative, therefore, that countries such as Malawi, the Dominican Republic and Haiti, which are in the early stages of formalizing their small-scale mining economies, respond to calls by Hinton et al. (2010), as reinforced by the ILO (1999) and Van Bockstael (2014) and others, to ensure that ‘licensing costs are in line with incomes’.

Second, there are situations where the framework in place for small-scale mining is very basic for the industry in question: blanket regulations and policies which are tailored to a specific segment of the sector, or systems whose designers believe are capable of servicing a broad spectrum of operators. Consider, for example, the case of Tanzania, where some amendments have been made to 'accommodate' a wider range of operators. Initially, under the country's *Mining Act 1998*, all small-scale miners were required to apply for a Primary Prospecting License (PPL) *before* applying for a Primary Mining License (PML); the former has since been abolished, and aspiring applicants can now apply for the latter directly. But it seems that these changes have been made with an ambitious view of transforming small-scale mining into a mechanized, potentially export-led sector. The introduction of a *Processing License under The Mining Act 2010*, a move made because of the view in policymaking circles that this is the direction that small-scale mining in the country should be moving, is one of the more revealing signs of this 'mind-set'. It is assumed, rather naïvely, that the country's small-scale gold miners can follow the lead of those in possession of a Processing License, and 'graduate' to using sophisticated techniques such as vat leaching. Such a transition, however, is impossible for most because of the capital investment required: a facility costs US\$50,000-US\$300,000 to construct, which, in a country reputed to have many hundreds of thousands of poverty-driven small-scale miners (Fisher 2007, Fisher et al., Jønsson and Fold, 2014), is clearly beyond the financial means of the average operator.

In recognition of the breadth of activities found in the small-scale mining economy, the priority in Tanzania and in other ACP countries such as Ghana, Suriname, Mozambique, Zimbabwe and Papua New Guinea should be to *disaggregate* distinguishable categories of operator. As it stands, in Tanzania, a PML, as defined in the country's *Mining Act, 2010*, applies to operations with investment of less than US\$100,000. This, however, can cover everyone from the individual panner working with rudimentary implements alongside his/her family, to more 'successful' operators who possess a labour force and some machinery. It is a system that clearly caters to the more sophisticated of setups but which, due to it treating such a rich diversity of small-scale miners as a homogenous bunch and subjecting them to the same rules and regulations, makes it challenging for the more artisanal of miners to legalize and access support.

What makes this approach particularly disconcerting, however, is its replication: similar efforts undertaken in the past to formalize small-scale mining through 'forced' mechanization and development have simply galvanized elites or affluent operators. There was evidence as far back as the early-1990s in Brazil, where a move was made at the time to issue only cooperatives not individuals with a garimpo license, that such an approach disadvantages the smallest operators (Barry, 1996). As indicated, the solution seems to be to subdivide further categories of indigenous mining, an approach which is already being pursued in Mongolia. In its draft *Law of Mongolia: Artisanal and Small-Scale Mining* there are three categories of

indigenous mining identified, for each of which, like Guyana, fees are also negligible: an artisanal mining license, with a fee of US\$0.1 per hectare; a micro scale mining license, with a fee of US\$0.2 per hectare; and a small-scale mining license, with a fee of US\$0.3 per hectare.⁴ For DM, such an approach is a much more effective means of ensuring that 'licensing costs are in line with incomes' than the 'forced mechanization and development' strategy being avidly pursued in countries such as Tanzania and possibly in the near future, Ghana.

Finally, and a point already raised, moving forward, the UN, the EU, ACP and partners will undoubtedly face the onerous challenge of formalizing and supporting an DM sector in countries where the domain of extraction is reserved for, and policies are built around, nurturing the growth of export-led, large-scale mining. Apart from the orientation of policies, the most significant challenge will be finding the 'space' to execute revised plans for DM: in most ACP countries with lengthy mining histories, the vast majority of mineralized lands are in the hands of large-scale companies engaged in extraction and exploration, a point which will be elaborated in in Section 7. Hilson (2013) cites a number of cases from sub-Saharan Africa, including Uganda where, by the end of 2000, there were 221 outstanding exploration licenses (136 Exclusive Prospecting Licenses, 95 Location Licenses, and 15 Mining Leases), more than four times the number of licenses in 1990; Tanzania, where mining companies are granted areas as large as 150 km² for reconnaissance and prospecting; and Ghana, where there are now more than 380 active large-scale mining and mineral exploration concessions in Ghana, and although estimates vary, it is believed that in combination these leases cover at least 25 percent of the country's land area. A quick glance at the series of concession maps available on *Flexcadastre*,⁵ including those of Tanzania, Papua New Guinea the DR Congo, Mozambique, Zambia and Uganda, reveal that a sizable section of many ACP countries is, indeed, now in the hands of – mostly, foreign – large-scale mining and mineral exploration companies. While most of these concessions are for high-value minerals, the question remains, where, in these policy landscapes, can a more formalized DM sector take root?

The report thus far has focused predominantly on the policy environment for DM in ACP countries. With few exceptions, it has been both restrictive and constrictive, a direct result of failing to commit sufficient resources to understanding the organizational structures of this very dynamic economy, avoiding creating a 'space' in policy to facilitate its development and support, and using analysis of its structures to inform the design of regulations and permits. This oversight has had the effect of 'informalizing' this sector. It is only in this context – a confinement to informal 'spaces' – which DM's economic and social impacts, and the appropriateness of its regulatory and institutional apparatuses, can be accurately appraised.

⁴ 'Law of Mongolia: Artisanal and Small-Scale Mining'. See www.swisscooperation.admin.ch/mongolia/.../resource_en_177934.pdf (Accessed 14 April 2015) .

⁵ 'Flexicadastre' www.spatialdimension.com/Map-Portals (Accessed 14 May 2015).

5. Demand and Supply Issues

Exceptionally unique supply chains have emerged within the informal ‘spaces’ the DM sector has been confined to. It is within these ‘spaces’ that a range of actors have emerged – at times, unexpectedly – who drive these supply chains. Each is unique in its own right: its composition, structure and design, and is shaped heavily by the small groups and families engaged at all levels of the production process. In light of the sector’s informality, a Global Value Chain (GVC) analysis, which emphasizes vertical interactions, is incapable of uncovering completely the host of transactions that take place in the sector, both on the demand and supply sides (Giuliani et al., 2005; Banga, 2013). In an informal setting, where operators are virtually cut-off from formal support channels, a Global Production Network (GPN) approach, which emphasizes horizontal analysis (Ernst and Kim, 2002; Henderson et al. 2002), is likely to yield more valuable insight on the dynamics of actors driving the demand and supply of commodities harvested in the DM economy.

When the DM value chain is viewed horizontally or through a GPN ‘lens’, it quickly becomes apparent how activities not only generate value locally and supply a number of markets at both the country and international levels but that they play an integral role in sustaining a number of rural economies. The dynamics of DM supply chains and the markets they supply are, therefore, examined with a view to protecting the survival of the families and small groups which drive them, as well as the fragile economies they are an integral part of. An attempt is made to explore the markets and supply chains of different commodities, although not surprisingly, because of the involvement of international stakeholders and the contributions they make to international markets, precious metals and stones have received the most coverage on this front in the literature.

5.1 The DM Economy’s ‘Rootedness’ and Composition

Before exploring the dynamics of the supply chains and markets of different segments of DM, it is imperative to first build on points raised earlier concerning the sector’s ‘rootedness’ and its links to other economic spheres. There is little disputing small-scale mining’s association with poverty: the DM economy is most vibrant in the world’s poorest countries. Research carried out over the years (e.g. Maconachie, 2011; Pijpers, 2014) has revealed that, in these locations, the sector is a deeply-rooted and indeed integral component of countless rural communities as well as a number of peri-urban economies. For the people involved, therefore, much of the ‘value’ derived from activity is, in the spirit of its poverty-driven nature, linked to family survival.

It was Maconachie and Binns (2007) who, in a longitudinal study of rural families, spanning 30 years, in Sierra Leone first examined in considerable depth the linkages between small-scale diamond mining and farming. Here, it was explained, the two activities ‘dovetail’.

Significantly, the references made in the past – albeit chiefly in passing – to the symbiosis between the two activities suddenly had resonance: Wels (1983) observation that '[small-scale miners] provide employment, full-time or seasonal, in depressed agricultural areas, and reduce the drift to towns' (p. A 19); Noestaller's (1987) claim that 'Labor intensity is particularly great in VSSM [very small-scale mining] operations of artisanal mining districts, where engagement in mining is frequently intermittent in accordance with seasonal work in agriculture' (p. 14); Chachage (1995), who, in reflecting on experiences from the early-1990s in Geita, which continues to be one of Tanzania's richest gold mining districts, reported that 'what is interesting is that many of the villagers who are investing in food agriculture have done so on the basis of profits from gold' (p. 90); observations made by officials at the ILO nearly two decades ago that 'Artisanal gold mining is normally combined with agriculture... [that] After the rainy season tens of thousands of workers flock to the gold mining sites, although some work all year despite the sites being officially closed because of the dangers of flooding' (ILO, 1999, np); Hentschel et al. (2002), who observed that there are 'Seasonal ASM activities [embedded] within the agricultural cycle', which 'seems to be the most common origin of ASM activity and normally stable communities are involved' (p. 15); Mondlane and Shoko (2003, p. 67), who reported at the time of writing that in the Mozambican townships of Niassa and Manica, an estimated 30% of rural inhabitants are now engaged in small-scale mining solely to 'complement earnings from agriculture, which is mainly practised in the rainy season'; and reports made by Maponga and Ngorima (2003) that in particular areas of rural Zimbabwe, proceeds from gold sales are reportedly 'lubricating' communal and resettled farmers' agricultural activities, in turn, enabling them to purchase crucial farm inputs such as fertilizers.

Since publication of the Maconachie and Binns (2007) study, the linkages between small-scale mining and farming have been extensively reviewed, although mostly across sub-Saharan Africa. Here, this phenomenon has been explored by scholars in such countries as Mali (Hilson and Garforth, 2012; Teschner, 2014), Ghana (Banichirigah, 2008; Okoh and Hilson, 2011), Burkina Faso (Werthmann, 2009; Luning, 2014), Mozambique (Dondeyne and Ndunguru, 2014), Malawi (Kamlongera, 2011; Kamlongera and Hilson, 2011), Cameroon (Bakia, 2014; Weng et al., 2015), Sierra Leone (Cartier and Burge, 2011; Pijpers, 2011; Maconachie, 2011), Tanzania (Kwai and Hilson, 2010; Bryceson and Jønsson, 2010), DR Congo (Perks, 2011), and Liberia (Hilson and Van Bockstael, 2011; Hilson and Van Bockstael, 2012; Van Bockstael, 2014). What this body of analysis has shown is that earnings from small-scale mining are actually used to improve families' livelihoods: purchasing farm inputs such as fertilizers, to pay for school fees, to finance the construction of improved housing, and as a platform for wealth creation through investment in other business ventures, such as hotels and chemical dispensaries. The linkages between agriculture and small-scale mining have not been explored in much depth in Pacific or Caribbean countries. In fact, aside from Papua New Guinea, where Moretti (2007), reinforcing earlier claims put forward

by Hentschel et al. (2002) and Crispin (2003), reported that 'Some of these part-time miners mine only seasonally, either because of the availability of rainwater (too little and too much water impede mining), and/or because they mine only when they have particular cash needs, such as at the beginning of the school year when school fees are needed, or at Christmas and Easter when people need cash for Christian celebrations' (p. 5), there is virtually no analysis of this phenomenon in the Pacific or Caribbean.

This body of literature engages quite critically with the 'poverty-driven' narrative. As stated in UNECA (2003) the growth of informal small-scale mining activity is linked to structural adjustment. It states specifically that 'the effects of structural adjustment, particularly in sub-Saharan Africa, which increased unemployment, mine redundancies in large mine companies due to crumbling mineral prices, and decreasing rural livelihood choices, chiefly in areas affected by natural (mainly droughts and floods) and man-made disasters concerning small-scale mining being mostly poverty-driven' (p. 3). It helps to explain why such a large number of smallholder farmers have moved into the sector: under structural adjustment, subsidies have been removed on crucial farm inputs, support structures for smallholders have been dismantled, and cash crops have been devalued (Hilson and Garforth, 2012). In addition to subsistence farmers, several other individuals from the public sector and large-scale industries made redundant under adjustment have avidly pursued work in small-scale mining camps.

There is, not surprisingly, an eclectic mix of people found in the small-scale mining economies. The organizational structures of small-scale mining communities vary across the globe, galvanizing unpredictably in informal spaces. In Sierra Leone, gender tends to determine the *types* of mining members of the family undertake. As Maconachie and Hilson (2011) explain, small-scale gold mining is undertaken by mostly women, presumably because of its connection to farming, whereas men carry out diamond digging, with the hope of landing the big prize. By contrast, in Suriname, Healy and Heemskerk (2005) explain, women constitute 5-10 percent of the population in most gold mining areas. A small number have managed to become mine operators, such as in the town of Benzdorp, where there is at least one Brazilian woman who owns a mining outfit and supervises the miners and in her absence, another woman takes her place. Most women in the country involved in the mining sector are based in the sector's service economy, working as transient vendors, cooks, sex workers, store owners, or a combination of the above. In Tanzania, there are what have been described as apprenticeships, in which aspiring young miners work under alongside a veteran operator (Bryceson and Jönsson, 2010).

When viewed horizontally, what also becomes clear is how dependent these operators are on middlemen for finance, as well as how organized they are. There has been considerable fanfare surrounding the former who, despite being the only option available for sponsorship, have been criticized for being exploitative and unfair (Hilson and Pardie, 2006; Buxton, 2013;

Bodenheimer, 2014). In the absence of microcredit and technological assistance, these middlemen assist operators with finance for labour, machines and even their household expenses. It should come as no surprise, however, that in informal 'spaces', middlemen and a series of other actors who extract 'taxes', payments or bribes, such as chiefs, policemen and army officials, exist. In Ghana, Hilson et al. (2014) report, operators are forced to pay massive sums to landowners and traditional leaders, which can amount to many tens of thousands of US dollars in fees. In Zimmerman, Kenya, K'Akumu et al. (2010) report that where quarrying takes place in public land without formal permission, an agency collects 'protection money', some of which is used to pay public officers. Payments are also paid in the amounts of Kenya Shilling 5000 (for public land) and Kenya Shilling 10,000– 50,000 (for private land). In the absence of a regulatory presence, such informal players will inevitably emerge and control supply and the sector in general.

Support for, and reform of, the sector, therefore, must be administered with the view that it plays an indispensable role in the rural economies of many ACP countries, where it is interconnected with agriculture, as well as recognition that it is a livelihood.

5.2 Supply and Demand for Construction Materials, Dimension Stones and Industrial Minerals

This section of the report reviews the supply chains for construction materials, dimension stones and industrial minerals in ACP countries, and the markets they service. These three categories of DM are grouped together here because of the dearth of information available on the supply and demand-side dynamics of each. Most of the accessible information on the subject focuses on the precious metals and stones being mined on a small scale, the supply chain and markets for which will be examined in Section 5.3. The section, therefore, will draw conclusions from a handful of cases for which analysis is available.

In developing countries, all three branches are mostly populated by informal or small-scale operations (Scott et al., 2003), and the commodities they produce are supplied mostly to domestic markets and the occasional neighbouring country. Channelling energies into transforming these sectors into export-led industries capable of supplying continuous product to developing and developed countries, therefore, would be futile. For aggregates, global annual production, which is in the range of 16.5 billion tons valued at US\$70 billion, are, because of the substantial quantities involved and accompanying transport costs, mostly sourced locally regardless of setting. In the US, for example, with the exception of Delaware, all 50 states produce crushed stone, sand and gravel (Langer et al., 2004). Working toward positioning an ACP country to supply a country such as the United States with building materials, therefore, would be highly-ambitious. Nor, despite the entrepreneurial spirit widespread in the DM sector, should efforts be made to push small-scale operators to compete with the large-scale companies, which already have a controlling share of the

international market for mined commodities such as phosphate and bauxite. The focus – at least in the short-term – should rather be on shoring up the industry to better serve domestic markets, given ongoing local development needs and demand for industrial minerals, dimensions stones and construction materials.

In some areas of the Asia-Pacific, there is regular demand for aggregates, brought about by the destruction caused by extreme weather and tsunamis. As Pelesekti (2007) explains, here, small nations, such as the Marshall Islands, Tuvalu, Kiribati, Tonga and Cook Islands are sourcing aggregates from their own beaches, above the beach and nearshore areas (lagoon and fringing reefs) and also from offshore areas. But in other Asia-Pacific countries, the DM sector suffers glaringly from the lack of markets and underinvestment. For example, in the Solomon Islands, the current slow rate of development is reflected by the low consumption for sand and gravel (Tawake, 2008). Although the potential for aggregates for use in infrastructure and domestic needs is, indeed, high, especially in the country capital of Honiara, the 'consumption of large volumes of sand and gravel is largely being driven by construction projects that are usually funded by aid donors' (p. 36). Once they have finished a project, therefore, a company may not have any business because of a lack of donor-funded project work, which stimulates the demand. Much of the same applies in Tarawa, where it has been reported that 'The demand for aggregate material for projects funded by donors is inconsistent from year to year, which means that a considerable portion of the dredge's production may have to be sold to the domestic private market when there is not sufficient demand from major projects' (Greer, 2007, p. 21). Caribbean nations seem to be facing the same challenges as their Pacific island counterparts. As demonstrated by the case of Jamaica, arguably one of the region's most vibrant mining economies, haulage costs and local availability of product have shaped the market for, and confined consumption of, aggregates domestically. Here, limestone is mostly used on the north coast, Montego Bay and the west of the island, whereas the market for sand and gravel is dominated by the country capital of Kingston and the central southern parts of the country. Most of these aggregates are sold either direct to the consumer by both illegal and licensed producers at the mined location to retailers, or internally within a vertically-integrated company producing readymix products or concrete blocks (Scott et al., 2003).

In sub-Saharan Africa, as illustrated by the cases of Kenya and Nigeria, the market for these minerals is, at present, local, largely due to the proliferation of informal construction trades under adjustment. There are, in most cases, discernible value chains which, when viewed horizontally, are comprised of several intermediaries whose energies move the commodity to the end consumer – the local builder. Again, due to activities taking place largely in an informal 'space', the pathways that emerge are often unpredictable. In Kenya, despite the sharp decline in public sector development (US\$2.84 million in 1985 to US\$0.72 million in 2006), brought about by structural adjustment, building construction has increased,

propelled by the proliferation of private contractors. Following a decline in 1993, cement consumption increased, reaching double the 1982 level by 1996, a direct result of the expansion of unrecorded building activity: between 60 and 80 percent of houses constructed in the country's urban areas, during the period 1985-1995, were done so without planning permission (Syagga and Malome, 1995). Overall, private sector participation in the building subsector, mainly in housing and in small commercial buildings, increased nearly fivefold between 1985 and 2006, from US\$8.54 million to US\$38.6 million (Wachira et al., 2008).

The country's quarry operators, therefore, have had a steady stream of business, seemingly unaffected by the retreat of the state. Here, within the informal 'space' created by the absence of government, there are several pathways which informal operators and buyers follow to access the market, in this case, the local building site. Several have been identified by K'Akumu et al. (2010) as follows:

1. The artisanal production unit sells to a developer, introduced by a broker and the developer then hires transport services to haul the stone to the building site.
2. The artisanal production unit sells to a vendor who hires transport services to haul the stone to the sale yard for resale to developers.
3. The artisanal production unit sells directly to a developer who hires transport services to haul the stone to the building site.
4. The artisanal production unit sells to a vendor who uses own transport means to haul the stone to the sale yard for resale to developers.
5. The artisanal production unit sells to a contractor who hires transport services to haul the stone to the building site.
6. The artisanal production unit sells directly to a developer who uses own transport means to haul the stone to the building site.
7. The artisanal production unit sells to a contractor who uses own transport means to haul the stone to the building site.
8. The artisanal production unit sells to a vendor introduced by a broker and the stocklist hires transport services to haul the stone to the sale yard for resale to developers.
9. The artisanal production unit sells to a contractor introduced by a broker and the contractor hires transport services to haul the stone to the building site.
10. The artisanal production unit sells to a vendor introduced by a broker and the stockist uses own transport means to haul the stone to the sale yard for resale to developers.
11. The artisanal production unit sells to a contractor introduced by a broker and the contractor uses own transport means to haul the stone to the building site.

The situation in Nigeria is equally-dynamic. As touched on in Section 2 of the report, Lagos, the country's commercial capital, is in the midst of a construction boom. Boasting the largest population in sub-Saharan Africa by a significant margin and an estimated 17 million housing deficit (Oonjo-Iweala, 2014), Nigeria is expected to continue experiencing a high demand for industrial minerals and construction materials for some time. An attempt was made quite recently to map the value chain of the industrial minerals being extracted on a small scale in the country (Hipwell et al., 2008) which, despite its many flaws, does shed some valuable light on the situation in the country.

Echoing earlier claims made by others (e.g. Lawal, 2006), the study correctly reported that in Nigeria, the industrial minerals and construction materials being mined on a small scale are, indeed, supplying mostly local markets. It furthermore argues that the value chain of many of these minerals 'seems to be crowded with traders and intermediaries who all yearn to secure a sizeable portion of the limited mineral profits' and therefore, 'the actual miners and labourers on the mine site see very little in the way of profits to help raise themselves above mere subsistence levels'. The authors use financial data to map the value chain for barite (reproduced in Table 6), pinpointing areas where exploitation is occurring, although it is unclear how these data were obtained, as well how accurate they are.

Egesi and Tse (2011) claim that, in Nigeria – and perhaps elsewhere – 'Small and medium-scale enterprises with appropriate technical know-how can be encouraged with soft loans to establish, as an effective production of dimension stone will reduce unemployment, diversify the quarrying industry and economy'. Given that four countries account for roughly 50 percent of production and that dimension stones are a specialized market (Italy being renowned for producing the most superior product), however, this is a highly-unrealistic goal. The challenge on the whole, explain Ashmole and Motloun (2008a), is that 'The stone industry has historically been extremely fragmented in terms of the size and numbers of companies involved, with most dimension stone operations being small under-capitalised owner operated businesses', populated mostly by small modern quarries that 'can be established with an investment of between US\$ 1 and 5 million, depending on the scale of operation' and which, 'In countries such as India, China and Brazil, where labour is cheap, and [safety, health and environmental] legislation virtually non existent in terms of enforcement, the investment required can be as little as 10% of these figures' (p. 37).

Table 6: The Barite Value Chain in Nigeria

Chain	Buy (Naira)	Sell (Naira)	Expenses (Naira)	Profit (Naira)
Osina, Cross River (4.35-4.40SG)				
Miners (labourers)		3,000/t		
Co-operative (site owner/dealer)	3,000/t	20,000/t	6000/t local government	11,000/t
Middle men (tipper driver)	20,000/t	35,000-40,000/t	5,000/t Transport - (150,000/30 t) Community	10-15,000/t
Processor		90,000/t	Milling, bagging	Up to 50,000/t
Azara, Nasarawa (4.0-4.2 SG)				
Miners (labourers)		6,000/t		
Middle men (tipper driver)	6,000/t	22,000/t	100/t LG 100/t community 33/t mining ass. 1166/t loading 7,666/t transport	6,965/t
Processor	22,000/t	90,000/t	Milling, bagging	Up to 68,000/t

Source: Reproduced from Hipwell et al., 2008

The focus should continue to be on supporting local operators with the aim of supplying domestic markets.

5.3 Precious Metals and Precious Stones

For many metals, production is largely carried out by multinationals, largely because primary mineral extraction and processing lends itself to large-scale extraction. In the case of bauxite, for example, 10 companies account for 60 percent of global production (Nappi, 2013). For minerals such as bauxite, copper, nickel and iron ore, because of the volumes involved, and international players' monopoly on production, it is unlikely that with any amount of support, small-scale mining could ever contribute more to global output.

For other metals, such as tantalite, tin and tungsten, there is significant scope for further supporting operators, particularly in the Great Lakes Region of sub-Saharan Africa. Here, a series of mineral tracking ('bag and tag') schemes have exposed the nuances of informality and revealed how entrenched it truly is. In the DR Congo, small-scale tungsten, coltan and tin miners are linked to trading chains by intermediary traders (*petits négociants*) who purchase minerals or pre-finance mining operations, supplying equipment and supplies in exchange for minerals. These minerals are eventually sold to buying houses (*comptoirs*), which arrange for export (De Konning, 2011). Most of these miners, however, operate without an official artisanal mining card, and therefore denied technical support and finance. Poor road conditions have

isolated many territories from trading centres, which has led to minerals such as cassiterite being carried along paths through forests for many miles to border towns. In 2010, in North Kivu, there were 29 trading houses engaged in the exports of tantalite, tungsten and tin, and another seven in South Kivu (CIFR, 2012).

Crackdowns on the sourcing of 'conflict minerals' have put the mining industries in the Great Lakes Region into the global spotlight. The responses at the policymaking level have been significant: implementation of the Dodd-Frank Act in the United States, which requires companies trading on the US stock exchanges involved in tin, coltan, tungsten and gold supply from the DR Congo and neighbouring countries to undertake due diligence and source minerals from 'conflict-free' smelters; the OECD voluntary directive, Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas; and the ICGLR Protocol against the Illegal Exploitation of Natural Resources. The iTSCi traceability scheme is the most popular system that works within the contours of this policy framework (Matthysen and Montejano, 2013), and has established new boundaries for the market.

At the heart of the iTSCi scheme is the 'mining cooperative', regarded as 'a key entry point for development agencies' engagement in the mining sector' and seen as a unit which can more effectively 'negotiate more favourable marketing arrangements on behalf of their members, advocate better working conditions and security provisions, and press for employment creation through investment in processing facilities' (De Koning, 2009, p. 16). Its conceivers see the scheme as a potential game changer in a mining landscape which is clearly highly-informal:

The supply chain of minerals from the DRC is comprised of a complicated web of relationships, with materials from multiple small scale suppliers becoming mixed and processed at various stages of the chain and therefore losing individual identity. This is typical of artisanal based mining activities around the world and the consequence is that the provenance of material is very difficult to establish with absolute assurance. It is recognised that upstream verification of mine source is of key importance but this remain a substantial challenge. [ITRI, 2009, p. 6]

To date, 460 sites have been certified in Rwanda and an additional 500 in DR Congo (Cooper, 2014). Where the UN, EU and partners could help immeasurably is assisting partners with formalizing additional operators. These 960 operations are the major beneficiaries of a supply chains that have become increasingly vertically-integrated.

An estimated 10 percent of global gold production takes place on a small-scale, a segment of the economy which employs an estimated 15 million people worldwide. When viewed horizontally, it becomes very clear how complex the small-scale mining communities producing this gold are: they are comprised of a range of actors, including sponsors, labourers, skilled workers and educated individuals (Figure 4), whose interactions lead to the production of the most tradable commodity in the world. Because of its value and the fact

that it is a universal currency (Henstchel et al., 2002), the supply chains which they are a part of range from country-to-country. In Ghana, up until the recent arrival of a number of illegal Chinese 'gold seekers' (Hilson et al., 2014), the government buying agency, the Precious Minerals and Marketing Company (PMMC), was capturing most of the gold mined in the country. This occurred because the organization purchases gold at near-market prices in local currency from its licensed buying agents. It seemed that there was no incentive to smuggle. In Tanzania, however, despite the existence of similar services, there is smuggling. Here, as Fold et al. (2014) explain, Indian merchants, primarily of Gujarati heritage, control the marketing and selling of gold mined on a small-scale, most of which is 'exported' from Dar es Salaam or smuggled for exportation from neighbouring Kenya to Dubai or India. In Guyana, portrayed throughout this paper as a leader in promoting and supporting small-scale mining, as much as 35 percent of total declared gold production valued at US\$14 million projected was lost in the first five months of 2014 alone.⁶ Much of this is smuggled to neighbouring Suriname, where a much lower tax is offered. Of the gold that is captured in-country, all is sold to the government-run Guyana Gold Board. In Papua New Guinea, Lole (2005) explains, miners are permitted to sell gold to whomever they wish. It often changes hands a number of times before reaching Metals Refining Operations, the country's chief exporter of gold.

For diamonds and coloured gemstones, supply chains are much more vertically-integrated, featuring a number of international players. For global diamond production and coloured gemstone production, an estimated 10 percent and 80 percent of production takes place on a small scale, respectively. What is clear from the above analysis of the precious metals and precious stones sector in countries of the ACP is that the supply chains significantly differ from those that operate in the Development Minerals sector where the ultimate destination of the commodity is domestic, rather than international. This finding further supports the necessity for greater data, knowledge and research into the supply chains of industrial minerals, construction materials, dimension stones and semi-precious stones.

6. Mine and Quarry Management

This section will review the institutional structures in place to support the DM sector. Building on points raised in Section 2, it will examine the capacity of these institutions to regulate and legislate, as well as explore in greater depth efforts to bring operations into the legal domain. It will also explore the state of mining practices, and the organization of operations. What

⁶ 'Joe Singh worried over gold smuggling', *Stabroek News* www.stabroeknews.com/2011/archives/05/06/joe-singh-worried-over-gold-smuggling/ (Accessed 11 December 2014). 'Gold dealer fingered in major smuggling racket to Suriname', *Kaieteur News* www.kaieteurnews.com/2014/06/11/gold-dealer-fingered-in-major-smuggling-racket-to-suriname/ (Accessed 11 December 2014).

do these regulatory structures look like (i.e. are they sufficiently decentralized?), do they have sufficient capacity to facilitate formalization/legalization, are they capable of pushing the sector down a sustainable development path, and how can technical knowledge in the sector be enhanced?

This section of the document also builds on points raised in Section 3 about the orientation of the policy framework for small-scale mining in ACP countries. To recap, despite calls by Davidson (1993), the ILO (ILO, 1999), Hentschel et al. (2002) and others for small-scale mining and large-scale mining to receive separate treatment in policy, activities have, for the most part, been viewed homogeneously. Policymakers and donors have generally believed that the small-scale mining economy is populated almost exclusively by rogue entrepreneurs, and at the same time, have been reluctant to embrace the view that a large share of the sector's operators are driven to mine because of poverty, despite mounting evidence which points to this. These views have had a commanding influence on the design of policies and regulations for small-scale mining, spawning inappropriate measures and consequently stifling formalization. Institutionally, this has had an adverse impact as well, hampering efforts to bring small-scale miners into the legal domain even further. The effects have been significant, many of which will be explored here – areas which ultimately the UN, EU, ACP and partners must address if DM are to become more of a focal point in the development plans and programs of the ACP countries in which it is now widespread.

6.1 The Policy and Institutional Machinery

The first, and perhaps most important, area of concern is the sector's treatment in broader economic and development policy. Rarely – if at all – are 'small-scale mining' or 'artisanal mining' projected in the development plans of ACP countries as economic cornerstones to build around, moving forward. For sub-Saharan Africa, the location of the vast majority of the world's 'Heavily Indebted Poor Countries',⁷ the main documents in need of scrutiny are the Poverty Reduction Strategy Papers (PRSPs).⁸ Specifically, despite the sector's invaluable economic and social contributions in the countries where it is rooted, including providing a lifeline for many hundreds of thousands of families, few countries show much recognition of this in their PRSP. Most repackage the messages conveyed in the World Bank's inaugural blueprints for mining sector reform, *A Strategy for African Mining* (World Bank, 1992) and A

⁷ A classification devised by the IMF, 'Heavily Indebted Poor Countries' comprise a group of 41 developing countries which, at current levels of growth, are incapable of repaying their debts. See 'Heavily Indebted poor Countries', <http://stats.oecd.org/glossary/detail.asp?ID=1221> (Accessed 15 June, 2015).

⁸ Introduced by the World Bank and IMF in 1999, PRSPs set out a country's macroeconomic, structural, and social policies and programs to promote growth and reduce poverty. See 'What are PRSPs?' <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPOVERTY/EXTPRS/0,,contentMDK:22283891~menuPK:384209~pagePK:210058~piPK:210062~theSitePK:384201,00.html> (Accessed 13 June, 2015).

Mining Strategy for Latin America and the Caribbean (World Bank, 1996). When the sector is mentioned, it is typically portrayed in a negative light, with particular emphasis on its informality, environmental and health dimension (to be discussed in greater depth in Section 6), and conflictual relationship with large-scale operators (to be discussed in greater depth in Section 7). An ambivalence and uncertainty surrounding how to proceed with the sector is even detectable in successive PRSPs produced in countries considered to be leaders in the formalization and development of small-scale mining. Specifically, what appeared to be the makings of a vibrant policy debate on small-scale mining, poverty alleviation and economic growth, exemplified by powerful messages voiced in the first 'wave' of PRSPs, was quickly derailed by re-emerging and galvanizing arguments in favour of promoting large-scale, export-led extraction through foreign investment.

Consider, for example, the cases of Ghana and Tanzania, which are widely regarded as leaders in sub-Saharan Africa on the small-scale mining front and arguably two of the region's most 'mature' mining economies. The former's inaugural PRSP, *An Agenda for Growth and Prosperity* (IMF, 2003), seemingly responding to the calls of the ILO (1999) for greater inclusivity of the sector, argues that 'Current mining laws tend to disproportionately favour large-scale mining enterprises' and that in order 'To address this apparent imbalance, measures will be put in place to expand the scope and increase the support to the small and medium scale sub-sector with the view to making it the predominant means of exploiting minerals in the long term' (p. 91). Tanzania's second PRSP, *National Strategy for Growth and Reduction of Poverty* (IMF, 2005), echoes much of the same, stressing how 'There is need to balance the livelihood requirement of artisanal miners with the economic objectives of the large-scale operators' (p. 7). These progressive views rapidly fizzled by the next generation of these countries' PRSPs, for Ghana, the *Growth and Poverty Reduction Strategy (GPRS II)* (2006–2009) (IMF, 2006), and Tanzania, the *National Strategy for Growth and Reduction of Poverty II* (IMF, 2011a). Both fail to mention small-scale mining at all, and, in the spirit of *A Strategy for African Mining*, rather emphasize the importance of large-scale mineral extraction and exploration. The former goes as far to rationalize, in its most recent PRSP, *Medium-Term National Development Policy Framework: Ghana Shared Growth and Development Agenda (GSGDA)*, 2010–2013 (IMF, 2010), increased decentralized natural resource governance not because it could serve as a mechanism for facilitating formalization of small-scale mining but rather on the grounds that it offers a more effective platform for combating illegal mining and restoring areas degraded by illegal mining activity. The more recent wave of reformers, including Rwanda (IMF, 2013a) and Senegal (IMF, 2013b) and Mozambique (IMF, 2011b), have followed the same path, failing to legitimize small-scale mining's importance and/or regressing into discussions about its negative attributes.

In the case of the latter PRSP, the sector is not even mentioned, despite employing hundreds of thousands of men and women. Why has this happened? Recalibrated political ambitions and objectives have likely played a part but it could be more of a case of host governments failing to fully synthesize the messages projected in the *African Mining Vision* (AU, 2009). The Vision does do an excellent job of highlighting small-scale mining's importance but does not provide much of a blueprint to help governments realize these benefits. Where it is strong and what is arguably its main objective, however, is articulating how to go about extracting more revenue from large-scale mining. Perhaps in their efforts to do so, African ministers have overlooked the importance of simultaneously supporting DM and the small-scale operators who drive it. The messages relayed in the wave of PRSPs produced since the launch of the *African Mining Vision*, including cursory and dismissive claims about small-scale mining and the sudden re-latching on to the pro-large-scale mining dialogues of the 1980s and 1990s, certainly suggest that governments have become somewhat preoccupied with the royalty issue, at the expense of other major developments, including DM.

Where there has been oversight has been with the Millennium Development Goals (MDGs), which, over the past 15 years, have guided policy in virtually every arena of development. Yet, despite its growing importance in development, small-scale mining seemed to always be on the periphery of the MDG debate, unlike other important grassroots industries such as agriculture, fishing and various trades. But given the way small-scale mining has been so negatively portrayed in policy over the years, any comprehensive discussion about it being a featured aspect of local economic development, and effort to build it into national Millennium Account planning, would have been met with considerable resistance. There would have likely been a more favourable reception, given the nature of the dialogue on small-scale mining at the turn of the century, if the sector was built into the negative 'side' of the MDG debate – i.e. to problems, such as those in the area of environmental pollution and human health, that need to be fixed. Despite having very little traction at the policy level, one of the more significant contributions made by the now-defunct Communities for Artisanal and Small-Scale Mining (CASM) was the hosting of *The Millennium Development Goals and Small-Scale Mining: A Conference for Forging Partnerships for Action*, 16-17 June 2005, at World Bank headquarters in Washington, D.C. It sought to 'discuss how to raise awareness of the relevance of the artisanal and small-scale mining sector to development processes and to generate interest in the sector's potential to contribute to the achievement of a wide array of development goals', specifically, 'on ways to integrate more effectively ASM issues into the wider development agenda, both through raising the profile of the sector and through mutually beneficial alignment of ASM issues with other donor priorities, including the Millennium Development Goals (MDGs), capacity building for fragile states, and conflict mitigation' (World Bank, 2005, p. 9). The UN was one of the few organizations to explore these issues during its 'Mining' plenaries at CSD-18 and CSD-19, in 2010 and 2011, respectively. Whilst mostly exploratory, the presentations delivered (Hilson 2010, 2011; Maconachie,

2011) did, nevertheless, provoke significant discussion and feedback, so much so that UN officials are planning to make mining – including small-scale activities – a centrepiece of the soon-to-be-launched Sustainable Development Goals. It states on its website that ‘minerals are essential for modern living’, which ‘holds true for both large-scale, often multinational corporate, operations as well as for small-scale or artisanal ventures’.⁹

Once this broader development policy machinery is overhauled with the aim of including DM in broader economic and poverty-alleviation frameworks and plans, emphasis can be placed on amending more mining-specific strategies.

6.2 The Institutional and Regulatory Framework for DM

The second area in need of attention is the institutional and regulatory framework for DM. The lack of focus on small-scale mining in development policy in general has had a cascade effect, spawning, in many cases, policies and institutional support which is simply incapable of pushing small-scale mining down a path of formalization. There are several key points which need to be explored here.

The first, and a point alluded to in Section 3.2, concerns small-scale mining being an ‘afterthought’ in the mining policies and laws of ACP countries. In a country such as Ghana, in the main piece of legislation passed to attract investment in the large-scale mining sector, the *Minerals and Mining Act* (PNDCL 153), 1986, there is no mentioning of small-scale mining. In fact, and as already explained, it was not until a full three years later, in 1989, following implementation of the *Small-Scale Gold Mining Law* (PNDCL 218) that the small-scale gold mining sector was legalized completely. A Small-Scale Mining Division was created (which has since been dismantled) in the Minerals Commission, the country’s principal mining regulatory and policy-making body, to handle sector-specific issues. In other ACP countries such as Tanzania, Mozambique, Rwanda and Belize, however, the situation is not nearly as nuanced. Here, it seems to have been a case of a handful of officers in fairly sizable and bureaucratic government departments and divisions which in many cases cover a broad spectrum of natural resources – the Ministry of Energy and Minerals, the Ministry of Mineral Resources and Energy, the Geology and Mines Division of the Rwanda Natural Resources Authority, and the Mining Unit of the Ministry of Natural Resources and Agriculture, respectively – being assigned responsibilities for small-scale mining. But how much of a voice do these people have overall and, in particular, in ACP countries such as Belize, Haiti, the Dominican Republic and Malawi, where small-scale mining has barely registered on the development radar? The Government of Guyana offers a comprehensive – and doable – blueprint for achieving this, dividing responsibilities for the sector across four of its five administrative divisions in the GGMC: Environmental, Mines, Mines Division, Geological Services and Land Management.

⁹ ‘Mining’, <https://sustainabledevelopment.un.org/topics/mining> (Accessed 13 June 2015).

The goal should be to build DM into the agendas of other ministries and government departments. Perhaps the most effective approach for facilitating this, given the resistance of policy to embrace small-scale mining more in a positive light, would be for the UN, EU and partners not to try and convince governments of the sector's merits but rather to engage individual agencies in dialogue about how it affects the industries and/or issues they are mostly concerned with. For example, a discussion which broaches competing land uses in rural areas, including small-scale mining versus farming, would likely have a better chance of captivating the interest of, say, an agricultural ministry where staff continue to reject the idea that the two activities dovetail, as explained in Section 4.1. As has been shown in the past in countries such as Ghana with 'Operation Flush Out' and French Guiana with 'Operation Anaconda' (Verret et al., 2006; Hilson et al., 2007; Hilson et al., 2014), non-mining government agencies can be mobilized to tackle a mining issue – in this case, perceived illegality and the need for security – if coerced effectively. The key in this case is doing whatever it takes to get representatives from all areas of government, with the aim of generating a more holistic dialogue about DM, and to put the mining departments which make the key policy decisions in a position to be anticipatory. In the absence of such dialogue, these agencies have been forced to take more of a reactionary stance, responding to preventable situations when they arise.

In the absence of a dynamic thought-process at the policymaking level, ineffective initiatives have been undertaken, and anticipation is lacking. This is particularly evident in the approach taken to implement legislation, specifically, the expectation that existing apparatuses are capable of regulating effectively all branches of the DM sector, a serious oversight which has had the effect to 'informalize' small-scale mining. For example, the legislative frameworks such as the 1986 Mines and Minerals Act (Vanuatu), the 1990 Mines and Minerals Act and 1996 Amendments and the Mines and Minerals Regulation 1996 (Solomon Islands), and the Land (Removal of Sand) Regulation under the Lands Act (Tonga) have very limited administrative application for aggregates management including any dredging (Pelesikoti, 2007), which could explain the proliferation of unlicensed mining activity in each country. Malawi, despite being the location of one of Africa's most unheralded and dynamic DM sectors, continues to follow the outdated Mines and Minerals Act, 1981, a review of which commenced in 2005 but has yet to yield a revised and up-to-date, law (Kamlongera, 2011; Tilitonse, 2013). Moreover, and as will be explained in Sections 6 and 7, this shortsightedness has been the root cause of the host of conflicts between small and large-scale miners and responsible for significant environmental damage.

A second area in need of attention in a number of countries is licensing: there are simply too few schemes to cover the range of activities available. The problem, of course, stems from the narrow focus on commodities during the design process – an issue raised in Section 3.1 – which has had the effect of excluding other minerals. There is especially a need for

policies and licensing schemes which cater more to operators engaged in the extraction of construction materials and industrial minerals. In countries such as Uganda, for example, the regulatory framework excludes 'construction materials' from the legal definition of a 'mineral' (Hinton, 2005). The situation is particularly problematic in a number of Pacific Island countries, where, as indicated, there are 'very few existing relevant policies have been amended to include aggregates dredging' (Pelesikoti, 2007, p. 17). Only Fiji has standalone legislation for aggregates. In fact, Fiji offers valuable lessons for licensing. The country has, at present, seven categories of licensing, including two applicable to DM: a 'Mining Lease' and 'Alluvial Mining Lease'.¹⁰ This level of diversity is rare, even in countries such as Ghana and Tanzania, which have paid more attention to formalizing, regulating and supporting small-scale mining than any other country in sub-Saharan Africa. Whilst Tanzania has made some strides on this front by now offering the aforementioned *Processing License*, courtesy of the *Mining Act 2010*, given the diversity of their small-scale mining economies, both countries are in need of, at the very minimum, 'artisanal' and 'medium-scale' categories of licenses, as well as more comprehensive provisions that adequately cater to the full complement of minerals being extracted. Once again, Guyana offers a valuable lesson in this area, granting prospective licensees, under the *Mining Act, 1989*, the option of obtaining a small-scale mining claim, which covers an area of 1500 ft X 800 ft, and a Medium Scale Prospecting and Mining Permit that covers between 150 and 1200 acres.

The final area in need of attention is the decentralized apparatus for licensing and permitting. As Venugopal (2014) explains, 'The advantage of decentralized mineral licensing is that it brings the decision-making (including processing license applications, issuing exploration or mining licenses and enforcing compliance with licensing rules) closer to where exploration or mining takes place', the basic argument in favour of such an approach being that 'local decision-makers are more familiar with potential and actual environmental, social, and economic impacts to the area, and are thus able to make decisions that will bring greater protection to and greater benefit for the local population' (p. 7). Most countries which have legalized small-scale mining have in place decentralized regulatory and permitting systems. But the influence of and power devolved to the regulatory 'eyes on the ground' vary from location-to-location, which has had an impact on formalization. In Ghana, for example, there are now nine Minerals Commission district centres scattered across the country, at which prospective registered miners are required to 'kick-start' the licensing process. But district officers actually have no authority to make decisions on applications; it is a bureaucratic process which can take several months or even years to complete because applications must pass through several hands and require 'approval' of the Minister of Lands and Natural Resources, who is based in the country capital of Accra (Hilson et al., 2014). Neighbouring

¹⁰ 'Papua New Guinea, Mineral Resources Authority', www.mra.gov.pg/en-us/license.aspx (Accessed 12 July 2015).

Burkina Faso, however, lags far behind even Ghana. Here, as Cote (2013) explains, the decision making power over licenses has not yet been devolved fully to municipal councils, as gold remains property of central state (Article 5 du Code Minier 2003). It is rather the signature of Mayors that is only required to authorise an artisanal authorization for mining.

But in Tanzania, it has. Under the new *Mining Act 2010*, explain Jonsson and Fold (2014), the assistant commissioners of minerals in each of the country's eight mining zones can authorize activities, a move which, it is believed, will expedite decisions on applications for Primary Mining Licenses. Once again, Guyana has in place the 'gold' standard. The country's vast network of GGMC offices, each staffed with experienced engineers, surveyors and geologists and which spread to all corners of its vast interior, provide immediate assessment of licensing applications. The widespread formalization in Guyana is no doubt buoyed by its strong small-scale mining association. The Guyana Gold and Diamond Miners Association, which has representation in all corners of the country, educates its members and assists them with obtaining their permits. The Guyana case illustrates how having in place a robust small-scale miners association can be an extremely effective mechanism when it comes to jockeying for position in policy dialogues. The Guyana Gold and Diamond Miners Association is so powerful that it has managed to alter the terms of the country's US\$250 million Low Carbon Development Strategy funded by the Norwegian Government. Table 7 presents the details of small-scale mining associations in selected ACP countries.

These are issues which the UN, EU, ACP and partners should prioritize in their efforts to formalize the DM economy – 'pressure points' which, if attended to, could help to reshape the institutional environment for small-scale mining. The next two sections of the report focus on the social and environmental consequences of the sector's inadequate policy treatment.

Table 7: Representative Small-scale Mining Associations in Selected ACP Countries

Country	Name of Association	Brief Description
Namibia	Erongo Regional Small-Scale Miners' Association	<ul style="list-style-type: none"> Established in 2007 Registered with the Ministry of Mines and Energy in 2008 Goals are for protecting, representation and advancement of interests of members Consists of a technical committee responsible for equipment rental to miners; land committee for negotiation and resolution of land acquisition and disputes Seeking to establish an international marketing front to enable members to sell minerals at market prices Lack of trust between members and association forestalls group initiatives

Guyana	Guyana Gold and Diamond Mining Association	<ul style="list-style-type: none"> Established in 1982 Registered under the Trade Union's Act Membership includes all miners: large scale, medium and small scale Lobbies for legislation which favours the association Enforces the Mining Act Law Act 2011989 and its regulations
Papua New Guinea	Wau-Bulolo Gold Miners Associations (no longer active) the area lacks such groups	<ul style="list-style-type: none"> n/a
Zambia	Federation for Small Scale Mining Association	<ul style="list-style-type: none"> 2008 14 regional mining associations Objective is to promote sustainable development of the small-scale mining sector Lobbying for change in legislation in favour of its members as they pay 5% royalty taxes while MNCs pay 3%

7. Community Development Concerns

On its own, the mining of DM pose very little adverse impact locally. There are health and safety, as well as environmental, concerns (discussed in Section 8) but aside from these, the social impacts of DM are, for the most part, negligible. There are, however, some issues worth mentioning here.

Where complications can arise are in situations where DM are prevented from formalizing. In line with views expressed throughout this document, this, once again, can be traced back to the failure to create adequate 'space' in policy to ensure the effective formalization of activities. An unregulated DM sector has the tendency to grow in a disorderly and unsustainable fashion. As captured in a number of studies (HRW, 2015), most of which fail to associate these complications with the sector's informality, without the protection of licenses and in the absence of a forceful regulatory presence, sites become what policymakers and the general public now believe the sector to be: an industry made up of a handful of ragtag operations which spawn settlements that become epicentres of sexually-transmitted disease, excessive narcotics consumption and crime.

Failure to put aside land for small-scale miners can also lead to complications with large-scale operators. As has been reported in a number of ACP countries, including Ghana, Papua New Guinea and Tanzania (ILO, 1999; Lange, 2006; Hilson and Yakovleva, 2007), small-scale miners who are unable to secure a license often encroach on to concessions awarded to large-scale mining companies. Although these miners are often working sections of the

concession that the mining companies are not working, they are unable to secure a license because it is in the hands of the said operator. A sound formalization framework which treats large-scale mining and small-scale mining equally is a key to preventing such outcomes.

8. Environmental and Health and Safety Concerns

Due to its confinement to informal 'spaces', the environmental footprint of the Development Minerals sector can be significant, and the health and safety record is quite poor. Surprisingly, few scholars and policymakers have made this crucial link: that small-scale mining operations have such abysmal environmental and health and safety records because they operate *outside of* the legal bracket and are generally not monitored.

Experiences in small-scale gold mining dominate discussions about the environmental and health and safety aspects of small-scale mining and they should be distinguished from the mining of industrial minerals, construction materials, dimensions stones and semi-precious stones. For over three decades, there have been detailed accounts produced about how process chemicals used for gold extractions, such as mercury, can bioaccumulate in various biota, and pose a serious threat to human health. The list of ACP countries covered includes Ghana (Tschakert and Singha, 2007; Bortey-Sam et al., 2015), Guyana (Howard et al., 2011), Burkina Faso (Tomicic et al., 2011), Mozambique (Drace et al., 2012), Tanzania (Nyanza et al., 2014), Suriname (Ouboter et al., 2012) and Papua New Guinea (Crispin, 2003). Inorganic mercury, used to amalgamate gold because of its inexpensiveness and effectiveness, methylates in the natural environment, and once ingested in the body, can cause a series of health complications, from neurological disorders to digestive complications (Wolfe et al., 1998). Public outcry over mercury use in the small-scale gold mining sector led UNIDO to launch the Global Mercury Project, a five year project (2002-2007) involving six countries (Brazil, Lao PDR, Indonesia, Sudan, Tanzania and Zimbabwe) which sought to introduce cleaner technologies, train miners, develop regulatory mechanisms and build rapport with government. Significant – potentially industry-changing – work was carried out but because the project was virtually standalone, and not built into the broader development objectives of these countries, the impact has been minimal. As has been emphasized repeatedly throughout this report, unless such complications are viewed holistically – specifically, as 'expressions' of the sector's informality – then they will never be resolved. In this particular case, formalization would lead to improved monitoring, more effective regulation, enforcement and a continuous educational presence. This is where the lessons from the gold sector become relevant to understanding the environmental and health and safety challenges associated with DM.

Where the small-scale mining of gold is plagued by the environmental issues associated with process chemicals, the most commonly reported environmental problem in the DM sector, pervasive across all branches, is land degradation and associated erosion and

contamination. In Papua New Guinea, for example, Morelli (2007) reports that miners clear sizable tracts of vegetation in search of mineral-bearing ore, in the process removing fertile topsoil and leaving behind exposed rock and waste. Entire mountainsides and riverbanks are also removed. Studies conducted in Kiribati (Greer Consulting, 2007) and elsewhere in the Pacific (McKenzie et al., 2006; Ambroz, 2008), under the auspices of the SOPAC project, have provided detailed insight on the environmental impacts of the mining of aggregates in coastal areas. Being in the path of tsunamis, many of these islands have little choice but to target local sources of aggregates during periods of restoration, which places considerable strain on the local environment. This became clear during the aftermath of the 2007 tsunami when, as Pelesikoti (2007) explains, materials were urgently needed to construct almost 80,000 completely destroyed and more than 40,000 partially destroyed houses, schools, private and public sector buildings, which led to local sourcing of sand, clay, timber, metal aggregates and coral limestone. Mining, by its very nature, is environmentally destructive, and in the absence of monitoring, requirements to reclaim or to post environmental bonds, permanent denuding of landscapes is inevitable.

As mentioned, formalization brings operations in the legal domain, where they can be regulated and monitored. The approach in some countries, such as Tarawa, has been to issue a 'soft ban' on mining locally. Here, the Taiwanese were forced to import aggregate for the construction of the Betio stadium and the Mormons imported all their requirements for their new church complex at Bairiki because they were prohibited from using locally-mined material (Greer Consulting, 2007). In Fongafale, households and people can legally mine sand and gravel inland on their own property at will but are required to secure a license, free of charge, when working the designated aggregate mining area of the coastline, the ocean-side beach parallel to the air strip. License holders are required to pay AUS\$2 per bag of aggregate collected, and those who do not possess a license are fined (Ambroz, 2009). There are certainly the basic building blocks of Environmental Impact Assessments for DM in place in the Pacific Islands, and with a few amendments, there could be comprehensive apparatuses formulated to ensure that operations, once in the legal domain, can be regulated and monitored effectively. Pelesikoti (2007) prescribes some recommendations for improving mining-specific EIAs, such as the move for national/provincial policies for aggregates dredging to include strategies for ecologically sustainable approaches that promote responsible environmental stewardship during the whole Aggregates Dredging Life Cycle, and for strategies to be consistent with national/provincial coastal and marine-use or land use plans and be supporting of participatory decision making. In fact, most Pacific Island countries either have standalone EIA legislation, or EIA provisions in legislation such as Environmental Management and Conservation or Physical Development Planning Acts.

Even in ACP countries with established mining sectors, it is difficult to find an effective EIA system for small-scale activities. In Tanzania, for example, Section 81 of the Environmental

Management Act compels developers to undertake EIA prior to development activities but whilst the government has remained active in enforcing EIA and a corresponding Environment Management Plan for large-scale enterprises, no EIA is undertaken for small-scale activities (Mwakaje, 2012). In Ghana, it is rather the opposite: the EIA in place for small-scale mining is virtually a checklist, and an unnecessary costly bureaucratic step in a laborious licensing process (Hilson, 2002). With the pieces in place, however, more appropriate EIA processes will no doubt emerge as the formalization of small-scale mining becomes more of a priority.

ilarly in Ghana, small-scale activities. In Tanzania, for example, small-scale activities in the legal domain, can be regulated

9. Entrepreneurial Skills

Interestingly, the UNDP, EU and ACP are looking to 'foster the sustainable and inclusive development of the small-scale mineral resources industry in ACP countries'. This is ironic because, as indicated, small-scale mining is treated as an entrepreneurial venture in policy, a perception which has shaped laws and support services for the sector. But are there mechanisms in place to nurture the growth of an entrepreneurial DM sector? This section of the report examines efforts taken to enhance the business skills of small-scale operators, focusing particularly on 'forced mechanization'. It concludes by providing critical reflections on how formalization of the sector can yield enhanced business opportunities.

9.1 Entrepreneurial Spirit?

The entrepreneurship culture is undoubtedly rich in most ACP countries. But there are two issues to consider before attempting to provide support services to small-scale miners. The first is that in virtually all corners of the developing world, most entrepreneurship is confined to informal sector. It is activity which, explain Bosma et al. (2008), 'is high particularly at low levels of economic development, as the economy may not be able to sustain a high enough number of jobs in high-productivity sectors... [but as] an economy develops, the level of necessity-driven entrepreneurial activity gradually declines as productive sectors grow and supply more employment opportunities' (p. 7). With most ACP countries straddling the poverty line, they are fertile locations for necessity entrepreneurial activities. As Diomande (1990) fittingly puts it, 'As necessity is the mother of invention, these entrepreneurs have developed a variety of unconventional approaches for creating and sustaining their businesses' (p. 191). The populations of ACP countries, therefore, would embrace a move to promote entrepreneurial small-scale mining activity.

But this leads to the ever-important second issue: the willingness of host governments to do this. The climate, at present, is not particularly receptive to such an idea. It does, indeed, promote entrepreneurship but tends to do so within specific industries. In the Caribbean and

Asia Pacific, for example, policy frameworks are oriented to promote entrepreneurship in the tourism and food processing industries (Fredrick and Kuratko, 2010). In sub-Saharan Africa, most of the discussion surrounds agriculture and entrepreneurship (Agriculture for Impact, 2014). For DM to be included in the business portfolios of each region, therefore, there would need to be a wholesale cultural change at the policy level.

Of late, however, there has been some interest expressed by policymakers to promote DM. In an attempt to make this a reality, funds for supporting small-scale mining have been included in broader mining sector reform projects. But most operators cannot access this support because they are unlicensed. This has proved to be a formidable barrier to improving yields in the sector and the efficiency of its operations: miners desperately covet finance, which is in short supply.

9.2 Developments

Many donors and policymakers see microcredit as a possible means of bridging the finance gap (USAID, 2012) but there is a detectable reluctance among financial institutions to shore up financial support for small-scale mining groups. Most microfinance schemes launched for small-scale mining to date have failed due to combination of failed repayments, a lack of collateral and unpredictable production (Hilson and Ackah-Baidoo 2011). Support has taken the form of microfinance, and has flowed from a variety of outlets, including government departments, donors as well as NGOs. For instance, in Mozambique, financial support has been provided by the government through the country's Mineral Development Fund, to registered mining associations (Dondeyne et al. 2009). In Zimbabwe, the Ministry of Mines, drawing on funds from the Mining Industry Loan Fund (Spiegel 2009), has also played a major role in financing small-scale mining activity, as well as providing extension services to miners.

Aside from government-supported projects, donors have financed interventions aimed at fostering support for small-scale mining in a host of ACP countries. In Papua New Guinea, for example, the Japan Social Development Fund (JSDF) supported a project aimed at improving the livelihoods and productivity of small-scale miners whilst simultaneously reducing the environmental and social impacts of activities on local communities (Mek 2011). On the whole, NGOs have been quite innovative in finding ways to support the sector. For instance, the NGO PACT developed a blueprint for supporting small-scale gold miners in the Democratic Republic of Congo through an initiative called 'WORTH' (Hayes 2009), under which, miners are provided with literacy training, education on financial management and are assisted with the establishment of savings groups. Although most of these projects have included an element of microfinance, and some of them have registered success, there are also dilemmas on how best to provide services to miners in most ACP countries.

Another recent approach to promote the sector's development – or to facilitate expansion – has been through what is referred to here as 'forced mechanisation'. The consensus among policymakers, as explained, is that most miners deliberately evade formalization but that if these miners are pushed would mechanize their activities. Despite recognizing that until miners legitimize themselves, they will continue to be deprived access to any support services, a 'forced mechanization' approach seems to overlook several factors, the first being the inequalities in access to financing among miners. Many individuals find themselves working in difficult circumstances due to accumulated debt from finances secured to fund their activities (Hilson and Ackah-Baidoo 2011). A 'forced mechanization' approach in such cases would have very limited impact. Mining cooperatives are seen as the mechanisms for operationalizing this idea: they are seen as vehicles which position operators to access machinery and other support services (USAID 2012). But whilst group formation undoubtedly assists miners with accessing microcredit and/or purchasing machinery, the cohesion within these groups needs to be strong. If not, the risk of disbandment is very real, which puts a small group of people in the difficult position of having to repay the loans themselves. Moreover, as not everybody is willing to work as part of a group, it can be difficult where individuals operate independently to pursue a policy of 'forced mechanization.'

Many artisanal miners sell their minerals at depressed prices. In cases where value addition machinery has been acquired, mining equipment secured, and operators are fully trained, often, the technology being used is not durable. Within a short period the equipment breaks down, and often, parts need to be imported, as most machinery is not locally manufactured or in some cases, requires an expert to come in to fix the machine. If the purpose of forming a group is to access machinery, frustration can set in if the group is seen to fail to serve its intended purpose. Most miners lack knowledge and capacity on many issues pertaining to operations, so instead of pushing them to mechanize without the requisite support, it would be more practical to ensure that they are trained and properly understand the implications of purchasing this equipment. They must make an informed decision.

For the DM sector to realize its full potential in ACP countries, activities must be formalized. Although not a panacea in itself, formalization would nevertheless go a long way toward ensuring that an increased number of miners receive support. Governments and donors are in general agreement that financial assistance is a key to improving the welfare of the DM sector and its operators.

10. Geo-Data and Maps Design

Whilst plans are firmly in place in most ACP countries to attract foreign investment and develop large-scale mining, the program for DM is, in most cases, non-existent. In the process of auctioning off numerous parcels of land to large companies in the likes of Tanzania, Ghana

and Papua New Guinea, governments have left themselves with very little space to formalize DM. For ACP countries only starting to reform their mining sectors, as experiences from the abovementioned 'mature' mining economies show, having a formalization strategy in place for small-scale mining *before* overhauling legislation for the sole purpose of attracting large-scale companies is a key to preventing conflict and ensuring the sustainable development of the DM sector over the long term.

As is the case with large scale activity, exploitation of minerals for small-scale mining starts with exploration. However, up until only recently, most countries did not make geological data publicly available. Artisanal operators, therefore, have often discovered new reserves via 'hit and miss'. As Mwaipopo et al. (2004) explain, these 'barefoot geologists', who have limited access to technology and finance, tend to locate minerals by chance. The key to pushing DM down a formalized path is having available geological data which can be obtained from ministries of mines and geological survey departments with relative ease. In most ACP countries, however, there is an acute shortage of geological data even within institutions, which undermines efforts made to enact new legislation and regulations to guide the mining sector, including small-scale mining activity (Maponga and Hilson, 2004).

The geological departments of most ACP countries simply lack the capacity to carry out comprehensive data analysis. Of the data they do have on-hand, most are outdated, having been generated from surveys conducted several decades ago using obsolete methods. The problem, as Gelb et al. (2012) explains, is that these governments do not have the financial muscle to assemble modern maps. Moreover, the government ministries normally responsible for public geological data provision lack the personnel and expertise to carry out the required exercises. Finally, there is often a culture of secrecy (lack of transparency), which makes it difficult for government officials to make available publicly information such as geological data. The lack of publicly available data was an issue broached recently at a workshop in Kinshasa, which explored the challenges of fitting small-scale mining into the Extractive Industries Transparency Initiative (Hilson, 2015). Here, it quickly became apparent that governments need to be engaged about the importance of making available data, and the implications not doing so has for the development of formalized small-scale mining activity. There are, however, a number of country profiles that have been made available on Flexicadastre, which superimposes mine leases on to maps. The tool identifies 'Small-scale Sector Management' as one of the main issues it seeks to address, and, by providing up-to-date information on the locations of leases, is an invaluable tool for identifying free spaces. To date, the mineral landscapes of a number of ACP countries have been constructed, including that of Zambia, Tanzania, Uganda, Papua New Guinea and DR Congo.

On a positive note, of late, there has been considerable interest in a number of ACP countries (particularly in sub-Saharan Africa) to re-map landscapes in order to update geological databases. For instance, the World Bank has funded over 13 geo-data projects in more than

13 developing countries, including Papua New Guinea and Botswana (World Bank 2013). The lack of geological data is a formidable barrier to the formalization of DM activities.

11. Country Case Studies

Building on the points raised thus far, this section of the report presents a series of country case studies. Each offers valuable insight into the challenges with formalizing DM, as well as a glimpse of effective policy treatment of the sector. In total, six cases are examined briefly in turn: Malawi, Ghana, Nigeria, Guyana, Papua New Guinea and Fiji.

11.1 Malawi

Malawi is a particularly intriguing case because it is a rare example of a country that is attempting to transition toward mining. Never a featured aspect of Malawi's development portfolio, mining is now due to be integrated into economic plans moving forward, an ambitious prospect in a country that has long depended, financially and largely to its detriment, on exports of a devalued and dwindling tobacco crop. Malawi has been quite pedestrian in overhauling its rather archaic mining regulatory and policy frameworks to reflect more accurately its revised goals moving forward. The *Mines and Minerals Act of 1981* (GOM 1981), which has been in revision for over a decade, is one of the oldest mineral codes in sub-Saharan Africa. Until a more suitable piece of legislation and revamped policy framework is implemented, the goals being pursued will never be fulfilled.

In recent years, discussions on mining in Malawi have been dominated by uranium, in particular, Paladin's Kayelekera operation (Kamlongera, 2013; Chareyron, 2015). But in 2013, the government implemented the *Mine & Minerals Policy of Malawi* (Government of Malawi, 2013), which 'seeks to stimulate and guide private mining investment by administering, regulating and facilitating the growth of the sector through a well-organized and efficient institutional framework' (p. vi). It proposes to achieve this through attracting both 'foreign and local investments in the exploration and production of minerals' (p. 1). Importantly, however, it also 'provides for the role of artisanal and small-scale mining (ASM) and recognizes the potential of this sector to contribute economic growth and poverty reduction', identifying 'key issues ranging from the lack of regulatory framework, poor collaboration with medium to large-scale mining firms and lack of finance and training' (CEPA, 2014, p. 20).

11.1.1 Overview of Malawi's Mining Sector

For a country that has only recently embraced the idea of developing its mining sector, Malawi has an exceptionally diverse mineral base (Table 11). For decades, the most significant mining issue in Malawi was its supplying South Africa with labour for its operations (Harrington et al., 2004). Indigenous small-scale mining has always taken place in the country

but its impact has gone virtually unexamined in the academic literature, possibly because the national development agenda has long been built around agriculture. Consequently, the sector's activities are highly diffuse, and are poorly understood, organizationally.

Table 8: Groups of minerals with economic potential in Malawi

Group I (Most Potential)	Group II	Group III
Phosphates, bauxite, kaolinitic clay, coal, kyanite, limestone, rare earths, titanium and uranium	Barytes, chromite, copper, corundum, nickel, iron ore, gemstones, ornamental or dimension stones	Asbestos, beryl, diatomite, galena, gold, magnetite, tantalum, zinc, zircon

Source: adapted from World Bank, 2009

But despite these uncertainties, development targets for the sector are being built into successive PRSPs. In the last decade in particular, policymakers and donors have begun to take notice of how the country's small-scale mining sector has, indeed, become an important livelihood activity in the country. Policymakers now recognize that this activity 'has the potential to grow by increasing output and providing higher value products, especially cut and polished gemstones' (Tilitonse Fund, 2013, p 6). This message is made clear in the *Mine & Minerals Policy of Malawi*, which states that 'Artisanal and Small-Scale Mining (ASM) activities in Malawi have grown considerably in recent years and are a source of livelihood for many families in some rural areas', and 'has the potential to contribute towards poverty reduction and limiting rural-urban migration by stimulating local processing and manufacturing industries that provide employment opportunities' (Government of Malawi, 2013, p. 10).

Although estimates vary, small-scale mining provides direct employment to at least 40,000 Malawians (Dreschler 2001; World Bank 2009; Kamlongera and Hilson, 2011); both men and women engage in the sector's activities, at times alongside children (Gilbert, 2015). The vast majority extract gemstones, largely because of their value. In recent years, the extraction of a host of precious and semi-precious stones, including corundum, ruby sapphire, aquamarine, tourmaline, emeralds, rhodolite, blue agate and rose quartz, has increased country-wide (see World Bank 2009). But despite only recently attracting headlines, gemstone mining has quite a lengthy history in the country (see e.g. Dreschler 2001). Alongside this activity is a fairly sizable 'construction materials' branch. Most of the activities which fall into this category are unregulated: according to the World Bank (World Bank, 2009), over 20 quarry operators supply quarry stone for road and building construction; hundreds of artisanal workers continue to supply aggregate stone on the outskirts of urban areas; ornamental stones and granitic dimension stones are quarried, but in insignificant volumes; and hundreds of tons of kaolinitic clays are produced annually and small scale winning of sand and other clay takes place.

These activities are conducted almost exclusively on an artisanal basis, and are an invaluable source of supplemental income. Extraction is conducted mostly using manual implements:

equipment and accessories used include picks, shovels, hammers, combing hammers and sieves, and where possible, generators, water pumps, excavators and compressors are also utilized. Although there are more established mining activities in some locations, most small-scale mines found in Malawi are rudimentary in design, unlicensed and characterized by hazardous work practices (Kamlongera and Hilson 2011).

11.1.2 Demand and Supply Issues

For a long time, despite not being substantial, the only contribution to the economy from the mining sector in Malawi had been from the small-scale mining sector; there is still only one large-scale mine and a few other mine projects in the pipeline. There are no formal marketing arrangements for minerals produced by the small-scale mining sector in Malawi. Production figures are thus difficult to pinpoint. However, based on what anecdotal accounts are available, it seems that various types of minerals continue to be produced and sold. Stone aggregates, river sand, dambo sand, beach sand, and clay (for pottery and brick-making) production has remained robust due to the continued boom in the domestic construction industry. Local small-scale operators continue to supply various minerals to the construction industry at competitive prices. Although these miners are difficult to 'find' and their numbers, technically unknown, they are invaluable economically because they support the construction and jewellery industries.

The small-scale mining sector accounts for 95 percent of mine earnings in the country (Table 12). Precious and semi-precious stones are reportedly mined on a small scale in 14 of Malawi's districts, with production reaching as much as 700,000 grams per annum. Unofficial estimates show that Malawi is producing about 200,000 grams of gem-quality stones each year, the most abundant being aquamarine. Overall estimates of monthly production per miner, therefore, are projected at 1000-5000 grams.

But even for gemstones, there are no stable and established markets to buy from miners. Most gemstone production is seasonal and erratic, peaking during summer. This is due to a lack of finance, a shortage of technical expertise, lack of mining tools and the effects of the rainy season. Consequently, any gemstone that is found is immediately sold to pay for labour. Buyers have capitalized on this constraint and often offer very low prices for the gemstones. The absence of markets has thus promoted both illegal selling as well as buying. As such, the smuggling of minerals is high. Keeping track of sales let alone who benefits from the revenue accrued from sales promises to be exceptionally challenging moving forward. The dearth of available data on production, employment and sales makes accurate estimates of the amount being lost via smuggling virtually impossible to pinpoint at this juncture.

There is also a considerable domestic demand for coal and limestone which if harnessed and expanded could be important for import substitution. Limestone production has steadily increased in the artisanal mining sector over the years, servicing local markets. But the sector

remains underdeveloped: there is still a large quantity of lime being imported from other countries (Gilbert 2015). Generally, annual production for limestone is in the range of 3000 tons.

Table 9: Mineral production and monetary values, Malawi

2013			2014		2015 (Projected)	
Type	Quantity (tonnes)	Value (K' million)	Quantity (tonnes)	Value (K' million)	Quantity (tonnes)	Value (K' million)
Coal	67,024	826.68	63,673	785.35	60,674	885.45
Cement	60,895	42.99	57,850	40.84	67,870	50.74
Agricultural Lime	21,269	207.68	20,206	197.30	27,206	319
Other						
Uranium Concentrates	1347	49,090	1065	13,800	-	-
Phosphate	11,783	17.34	11,194	16.47	12,184	196.50
Rock Aggregate	1,092,808.3	1748.48	1,038,168	1661.05	1,111,478	1517.90
Gemstones	116.3	20.40	110	19.38	210	36.40

Source: Government of Malawi, 2015

11.1.3 Mines and Quarry Management

The mining sector in Malawi is overseen by the Ministry of Natural Resources, Energy and Environment (MNREE), under which there are institutions firmly in place for managing mining concerns – namely, the Department of Mines. This agency works hand-in-hand with the Geological Survey Department on policy issues pertaining to minerals and mining. But despite being in place for over three decades, both institutions are poorly resourced, lack technical capacity and are poorly organized, in large part because of the lack of policy emphasis placed on mine development over the last four decades. On a positive note, a small-scale mining section has also been formed within the Department of Mines to provide support the sector.

As indicated, the legislative framework guiding mining sector development in Malawi has also been in place since 1981. *The Mines and Minerals Act 1981* (GOM 1981) is the law which regulates mining activities in Malawi. Although a new Mines and Minerals Bill has been prepared by the consultant overseeing the review of the *Mines and Minerals Act*, critics have interpreted the slow progress on this front as a sign of low political will to improve the mining regime. The Department of Mines, however, does anticipate the revised Act to be presented before Parliament in 2015. Whilst *the Mines and Mineral Act 1981* covers a number of areas and has provisions for small-scale mining, it does not adequately address issues pertaining to the sector (Tilitonse, 2013).

Under the Act, there are four categories of licenses applicable to small-scale mining: a) the mining permit, which applies to sand, gravel, quarrying and brick making, and is issued by the District Commissioner's office; 2) the Non-Exclusive Prospecting Licence (NEPL); 3) Mining Claim License (MCL); and 4) Reserved Mineral License (RML), which allows for buying and selling of minerals. These licenses must be renewed annually. In addition to the *Mines and Minerals Act*, the aforementioned Mines and Mineral Policy (Government of Malawi, 2013) was recently implemented. It also has a dedicated section for small-scale mining which, along with the draft National Artisanal and Small-Scale Mining Policy (Government of Malawi, 2014) will no doubt help to shape the sector in the country. Although it would be premature to assume that even with these developments, a supported DM sector is a centrepiece of the government's grander vision for developing the country's mining industry, there is little disputing its poverty-alleviating potential. Both the Mines and Minerals Policy and the National Artisanal and Small-Scale Mining Policy will no doubt determine the fate of Malawi's mining sector in the years to come.

These institutions, however, are not particularly well-oriented to foster the growth of formalized small-scale mining in Malawi. First, the mining sector administration is highly centralized: although there has been a deliberate effort made to devolve responsibilities for small-scale mining activities to the local councils, the low human resource capacity in mining has prevented this from happening completely. There is also a disconnect between the *Mines and Minerals Act* and *Decentralisation Act* and therefore, the task of collecting royalties and fees from small-scale miners has not yet devolved to local councils. District offices have no powers; the central government continues to oversee all regulatory and policy matters, including licensing, despite the decentralized strategy that is now place. The Act gives too many discretionary powers to the Minister of Mines without due regard to the role of technical advice (Tilitonse Fund, 2013).

Officials at the World Bank (World Bank, 2009) have expressed concern about the licensing system set out in the Act, and its failure to provide some clarity as to how it is administered. It would benefit from being more streamlined but the system is littered with unnecessary bureaucratic hurdles and delays. Examples include the lack of legislative provision for prioritizing applications; mining claims have short duration (one-year rights); in the absence of strict rules and transparent processes, there is a risk that multiple applications could be submitted; and, according to the Department of Mines, the administration of licensing is prone to inefficiency and delay, due to the number of times in which paper records are passed from party to party, frequent calls for review, and infrequent/irregular decision meetings.

Overall, the licensing process itself is highly inappropriate for the poor. When an area is identified, a Department of Mines pegging officer must demarcate the mine claim area, after which, the individual must submit the application to the regional mines office or Mineral

rights section and pay an application fee of MK2000 for an MCL.¹¹ The maximum area for a claim is 2 ha and a maximum of three claims per applicant is allowed. The application is then submitted to the committee that recommends to the Commissioner of Mines for either approval or rejection, after which the decision is communicated to the applicant. Applicants can apply as an individual, an association or a company. Where an individual or company has been awarded an MCL, they are supposed to pay MK2000/km² as ground rent. The Mineral Rights section issues the license document and it is valid for one year. Where an individual wants to buy and sell quarried products, they must be in possession of a Reserved Mineral License, which costs MK10,000 and is also renewable annually. With this license, individuals are authorized to buy and sell quarry.

But Malawi seems to be on the right track. It is one of few African countries which, in successive PRSPs, has emphasized the need to support both large and small-scale mining, the latest document, *Malawi Growth and Development Strategy II 2012-2016* (IMF, 2012), reflecting on how increased revenue from rises in mineral production has put the government in a position to increase 'its ability to supply mineral raw materials to industries by developing capacity of both small scale and large scale miners' (p. 22).

11.1.4 Environment, Health and Safety Concerns

The informal nature of Malawi's small-scale mining sector has resulted in most activities going unmonitored. This has meant, *inter alia*, that operators do not receive any guidance on environmental issues. Pits are left open, and there is generally no land reclamation after mining, including the mining of sand which is widespread and leaves land degraded. Even in the case of gems, after exhausting stones in loose earth (alluvium) people abandon pits to open new ones in other areas. This is due to several reasons, including: the fact that pits may be deep and unsafe to work in; the miners might have reached the water table, after which the pits become water logged; and due to lack of appropriate tools needed to break the hard quartz rock in which most quality gem stones penetrate. These practices cause environmental degradation due to a lack of rehabilitation of the environment once the pits have been abandoned. There is a need to put in place mechanisms to ensure that sound environmental practices are enforced and followed. This would be easier if most small-scale mining activities were formalized.

11.1.5. Entrepreneurship Skills

Malawi has an extremely entrepreneurial culture. It is host to over one million Small and Medium-Sized Enterprises (SMEs). There are 760,000 SMEs, which generate a collective income of US\$2 billion. Only 60 percent of the SME owners use financial services, and close to 40 percent of SME owners surveyed in FinScope (2012) were borrowing. Some key

¹¹ US\$1 = MK440.

highlights on Malawian entrepreneurship are as follows (Mulaga, 2013):

- The recent 2012 Malawi MSME Survey, which provides an up-to-date account of SMEs in Malawi, established that 59% of SMEs operating in Malawi were excluded from financial services.
- It also found that financial exclusion decreases as the size and formality of the business increases (although interestingly, men tend to slightly be more excluded than women).
- The Government of Malawi has established a number of statutory and other institutions to help produce a conducive environment for the private sector across government, including the Malawi Export Promotion Council (MEPC) which recently merged with the Malawi Investment Promotions Agency (MIPA) to form the Malawi Investment Trade Centre (MIPC); the Malawi Bureau of Standards (MBS); the Malawi Industrial Research and Training Development Centre (MIRTDC); Small Enterprise Development Organisation of Malawi (SEDOM); Development of Malawian Enterprises Trust (DEMAT); and the Malawi Entrepreneurs Development Institute (MEDI).
- The 2011 Private Sector Development Programme (PSDP) highlights the following as the key constraints to SME growth in Malawi: a poor investment climate; weak culture of entrepreneurship amongst indigenous Malawians; a lack of access to capital and the high cost of capital for SMEs; weak private sector support institutions; outdated policy, legal and regulatory framework; and unreliable and costly infrastructure services.
- The World Bank Enterprise Survey (2009) for Malawi shows that 45.6% of surveyed firms reported limited access to finance as a major obstacle to doing business, whilst of the remaining firms, 8.9% identified poor transportation, 8.6% percent unreliable power supply, 6.2% exorbitant tax rates, 4.9% inadequately educated workforce, 3.8% crime, 3.6% complicated business licenses/permits procedures, 2.5% corruption and 1.7% limited access to land as the main barriers.

Recent efforts to formalize small-scale mining activities have sought to encourage miners to form cooperatives in an attempt to increase their bargaining power. Some cooperatives have, therefore, with the assistance of the Ministry of Trade's One Village One Product (OVOP) project, been able to access machinery for their operations. Most cooperatives, however, fail to maintain the machinery, do not repair it once it breaks down, and some members abandon the cooperatives when they believe that mechanization is not delivering tangible benefits *per se*. Whilst the cooperative approach may seem logical, there is a need to ensure that there are mechanisms in place which will ensure that members remain together. If properly incentivized and if licensing procedures are simplified, many individuals would no doubt pursue formalization.

11.1.6 Geo-data and Mapping

Inadequate geological data and insufficient information about mineral deposits are impeding formalization of Malawi's DM sector. As Table 13 illustrates, the available geological data on-hand is not particularly impressive: most were collected in the 1950s and 1960s. The Mines and Minerals Policy of Malawi identifies the problem (Government of Malawi, 2013), explaining that the full mineral potential of the country is not yet known. A lack of geological data has affected mining sector operations for a very long time as it is only recently that Malawi has started to experience increased levels of mineral exploration after more than 30 years of inactivity. Of late, there has been an influx of companies seeking to explore possibilities for mining. This has created an opportunity for people to develop some familiarity with a number of the minerals available to them in their areas of residence. In an attempt to address the inadequacy of available geological data, a geo-mapping exercise was carried out by the Geological Survey, with donor support (Gilbert 2015), the results of which are expected to be released before the end of 2015. It is anticipated that the exercise will uncover data on possible locations of mineralized areas which, in turn, could help to identify areas suitable for small-scale mining.

Table 10: Existing geological database of Malawi

Geological Maps <ul style="list-style-type: none"> • Geological Atlas of Malawi at 1:1,000,000, 1:250,000, 1:100,000 scales covering more than 80 percent of the country • Mineral Resources of Malawi at 1:1,000,000
Magnetic Contour Maps <ul style="list-style-type: none"> • Maps at 1:50,000; 1:100,000; 1:250,000 scales covering the entire country
Radiometric Contour Maps <ul style="list-style-type: none"> • Maps at scales of 1:50,000; 1:100,000; 1:250,000 covering the whole country are available for uranium, potassium and thorium
Electromagnetic Maps <ul style="list-style-type: none"> • At 1:100,000 scale covering only part of the country
Airborne Geophysical Interpretation Maps <ul style="list-style-type: none"> • At scales of 1:100,000; and 1:250,000 covering the entire country These include: <ul style="list-style-type: none"> – Magnetic Susceptibility Colour Plot (MSC) – Interpretation Colour Plot (INT) – Radiometric Ternary Colour Plot (TCP)
Topographic Maps <ul style="list-style-type: none"> • Maps at a scale of 1:50,000 covering the entire country are available
Documentation <ul style="list-style-type: none"> • A comprehensive geological library exists in Zomba at the Department of Geological Survey and at the Department of Surveys in Blantyre

Other Reports

- Mineral potential of Malawi series 1-4 (BGS 2009)
 - Geological Bulletins (provide information on exploration history)
 - Memoirs of the Geological Survey
 - Records of the Geological Survey
 - Unpublished technical reports
 - Annual Reports of the Geological Survey and Department of Mines.
-

Source: World Bank, 2009

The World Bank (World Bank, 2009) prescribes a fairly viable blueprint on how to go about achieving this. Previously-acquired data must be reinterpreted with modern-day techniques. As most parts of the country were mapped before independence using traditional geological approaches, with limited use of remote sensing, geochemistry and geophysics, maps are small and generally offer very little detail. Whilst airborne geophysical surveys were conducted in the 1980s over the entire country, the 1 km spacing does not provide sufficient information to guide further ground investigations or proper interpretation of geological features. As noted, there are key institutions in place capable of carrying out comprehensive mapping activities, namely the Department of Mines and the Geological Survey Department but both are woefully understaffed, although in recent years, several individuals have been trained in different areas in an attempt to bridge the gaping data 'gap' on their own. This shortage of funding is bound to further inhibit efforts aimed at formalizing small-scale mining but could be addressed with inputs from foreign geological surveys, such as the British Geological Survey or the Swedish Geological Survey.

11.2 Ghana

Ghana's geology is as diverse as any country in sub-Saharan Africa. Commercially, since the colonial period, the country's mining industry has been dominated by four commodities: gold, diamonds, manganese and bauxite. Whilst also blessed with rich deposits of a range of other economic deposits, including iron ore, limestone, kaolin, feldspar, silica sands, granite, salt and semi-precious stones, neither has managed to feature anywhere in national development plans.

Yet, despite these biases, few ACP countries are better positioned to develop their DM sector. For over three decades, Ghana has made mining a centrepiece of its national development strategy: between 1983 and 2011, the sector attracted an estimated US\$11.5 billion in investment for mineral exploration, and the development/expansion of mineral extraction projects. It, therefore, has in place a comprehensive regulatory, institutional and policy framework for mining.

The challenge for the EU and UN moving forward, however, is reworking this framework, which has been designed mostly for, and built mainly around, gold exploration and extraction.

Moreover, it promotes mainly large-scale, not small-scale, activity. Can the framework be overhauled with the aim of accommodating plans to develop further DM?

11.2.1 Overview of Ghana's Mining Sector

For over 100 years, Ghana has been one of the globe's leading producers of gold. During this time, it has been consistently ranked among the world's top ten producers of the coveted metal, its 107.9 t in 2013 placing it ninth globally. Significantly, an estimated one third of this was produced by the more than one million small-scale gold 'seekers' in the country, the majority of whom are illegal (Hilson et al., 2014). These operators are mostly selling gold on to licensed buyers who, in turn, sell it on to the government agency, the Precious Minerals and Marketing Company (PMMC) and/or a host of other independent buyers: in the period 1989-2010, the former alone collected 26.6 t of gold. There are a handful of registered small-scale miners who are also in possession of a license to export gold.¹²

There is also considerable potential for upping diamond production. Although Ghana is now regarded as one of the 'lesser players' in the production of rough in West Africa, this was not always the case. Activities are confined almost exclusively to the country's Eastern Region, more specifically, in and around the locality of Akwatia, where a tributer system has been in effect since the late-1980s at the Ghana Consolidated Diamonds (now Great Consolidated Diamonds) site (Hilson and Clifford, 2011). Whilst diamond production in the country has been robbed by undercapitalization and the channelling of financial and human resources toward gold mine development, opportunities remain. Often lost in discussions on Ghana's deteriorating diamond mining economy is how, as Table 7 indicates, the country was, in the late-1930s, the world's second largest producer of rough, generating output in the range of 1.5 million carats annually (Aryee, 2003; Canales, 2003; Nyame and Danso, 2006). Most of the stones recovered, since diamond mining began in Akwatia in the 1920s, have been of industrial grade: only 10-15 percent of product is 'cuttable' and 'polishable' for use in jewelry production, and diamonds of one carat or more may not be available in commercial quantities.¹³ Like gold, diamonds are also routed through PMMC. At the time of writing, there were 11 licensed diamond buying companies in operation: 1) IRIT Diamond; 2) Godmarks Diamond Company (India); 3) Gud Kulima Limited; 4) Aadinath Gems; 5) Kriom Diamonds; 6) Bhagya Laxmi Impex; 7) DWS Diamond Company (Israel); 8) Imperialdiam Limited; 9) West Africa Diamond Investment Limited; 10) Hollander & Sons; and 11) Balaji Gemlust Company Ltd.¹⁴

¹² 'Gold Production & Marketing' <http://pmmcghana.com/gold> (Accessed 5 June 2015).

¹³ 'Ghana Mining' www.ghana-mining.org/ghweb/en/ma/pmmc/pmmcgoldPM/pmmcdiamondEBP.html (Accessed 28 July 2008).

¹⁴ 'Diamond Production & Marketing' <http://pmmcghana.com/diamond> (Accessed 3 June 2015).

Table 11: Diamond production in Ghana, 1920s-2000s

Year	Carats
1926	152,150
1927	340,020
1928	501,450
1929	686,070
1934	1,142,270
1935	2,172,560
1936	1,523,910
1937	1,478,820
1938	1,380,340
1939	1,473,130
1940	869,840
1960	3,121,000
1961	3,039,770
1962	3,111,800
1963	2,879,250
1964	1,922,710
1965	2,574,590
1966	2,767,510
1967	1,883,880
1968	3,402,430
1969	1,676,190
1970	2,223,150
2000	878,011
2001	1,090,072
2002	963,493
2003	904,089
2004	920,050
2005	1,013,600
2006	972,600
2007	894,800
2008	643,300

Source: Chirico et al., 2010

Aside from gold and alluvial – predominantly, industrial-grade – diamonds, there is great potential for increasing production of a host of other commodities. Though not particularly

widely-documented, Ghana plays host to extensive quarrying activity, much of which features vertically-integrated activity. Examples include the following:

1. Sacron Quarry Ltd., established in 2008, which operates a quarry at Apo-Abo in the Gomaa District of the Central Region. It handles chipping of all sizes and is a manufacturer of precast concrete products, sold to construction firms and private parties engaged in civil and building construction in and around the Central, Greater Accra and Western Regions of the country.¹⁵
2. Mansco Quarry Ltd., which operates a quarry of 47.14 acres in the Akuapim South District of the Eastern Region. It provides quality granite chippings for various road and building construction projects in and around Accra.¹⁶
3. Naachiaa Quarry and Granite Ltd., which operates a quarry at Barekese in the Ashanti Region. It is a subsidiary of the Naachiaa Group of companies which has numerous infrastructural projects (roads, bridges hospitals, etc.) in Ghana. According to its website, the high demand for, and high unavailability of, aggregates in the country led Naachiaa to establish its own quarry.¹⁷

With Accra and Ghana's other major cities, such as Kumasi and Takoradi, booming, there is great opportunity for further developing the 'construction materials' branch of the DM sector in the country. With the abovementioned, and other small-scale, companies already working established quarries and servicing local markets, there is a very important foundation already in place to pursue such an idea.

Aside from quarrying, the most visible opportunities are in three areas. The first is development of the country's vast bauxite reserves. With the ongoing struggles of the Ghana Bauxite Company to increase output, perhaps it is time to pursue a blueprint which emphasizes small-scale mining. As O'Connor (1978) explains, this was the case in the early-1950s, when in both Guinea and Ghana, '[bauxite] production was confined to small-scale operations' (p. 86). The second area is dimension stones, an industry which has some potential to have an impact regionally. There were, at the turn of the century, four granite quarries (mining mainly pink and light-grey granites/migmatites) and one processing plant in operation in Ghana, servicing mainly local markets and those of neighbouring countries (Milazzo and Blasi, 2003). The situation remains largely unchanged. Whilst a more international outlook for exports may be unrealistic, Ghana is well-positioned, infrastructurally, to make this happen, with its two modern ports in Takoradi and Tema. The area that perhaps has the greatest potential for growth is salt, which is already an established industry in Ghana. As

¹⁵ 'Sarcon Quarry Ltd.', <http://sarconquarry.com/about-us> (Accessed 2 June 2015).

¹⁶ 'Mansco Quarry', www.manscoquarry.com/ (Accessed 3 June 2015).

¹⁷ 'Naachiaa Group', www.naachiaagroup.com/naaqua_brief_introduction.html (Accessed 12 June 2015).

Affam and Asamoah (2011) explain, Ghana has long produced salt for export; the industry dates back to the trans-Saharan trade many centuries ago. Only it, along with Senegal, has optimal climatic conditions for producing salt in West Africa, and at present, major sites are found in the localities of Keta, Ada, Weija, Komenda, Mfantsiman and Ahanta West. The problem, however, is that this sector is also undercapitalized. At present both countries are only capable of producing 350,000 t of salt annually when there is the potential to produce 2,500,000 t. With Nigeria importing US\$1.5 billion in salt from Australia and Brazil each year to satisfy the demands of its oil industry, there is a vast market for Ghana's salt.

10.2.2 Institutional Framework and Regulations

Legislatively and institutionally, Ghana is not particularly well-positioned to develop its DM sector. The principal law governing mining in the country is the *Minerals and Mining Act 2006* (Act 703), which replaced the *Minerals and Mining Law* (PNDCL 153). Both, however, were designed specifically to nurture the growth and development of large-scale gold mining, principally through tax breaks and investment incentives.

The sector is overseen by the Ministry of Lands and Natural Resources, and regulated by the Minerals Commission, established under the *Minerals Commission Act 1993* (Act 450), which is responsible for the regulation and management of the country's mineral resources. The Environmental Protection Agency weighs in on large-scale mine matters but is not responsible for the monitoring and regulation of small-scale mining. It does, however, mandate that prospective small-scale licensees complete an Environmental Impact Statement, which is not particularly comprehensive. Significantly, the *Minerals and Mining Act 2006* also repealed the *Small-Scale Gold Mining Law* (PNDCL 218), which officially legalized small-scale mining. Up until this point, prospective legal small-scale diamond miners were required to obtain a *Diamond Digging License* and continued to do so, as well as were regulated, by the now-defunct Mines Department up until implementation of the *Minerals and Mining Act 2006*.

Ghana's small-scale mining economy is mostly confined to informal spaces because of bureaucratic licensing procedures and regulations. The implications of this have been highlighted – mostly for gold and diamond mining – at length in the literature (Aryee et al., 2003; Hilson and Potter, 2005). The potential source of the problem is the Minerals Commission, which is tasked with promoting both large and small-scale mining in the country, a potential conflict of interest which leads to unfavourable outcomes marked by strained relations between the two parties. Despite repeated calls for an overhaul of this policy and regulatory framework for an industry being increasingly recognized to be populated by people who are impoverished and lack financial means, as Table 8 illustrates quite clearly, for individuals looking to secure a license to mine on a small scale and avoid the pitfalls of informality, the bureaucracy is enormous. Applications are put forward to work a plot no larger than 25 acres for a period of no more than five years, with the possibility of renewal for another five years (Section 85 of the *Minerals and Mining Act 2006*).

For precious metals and precious stones, to help 'kick-start' the licensing process, the Minerals Commission has in place nine district offices across the country – Tarkwa, Asankragwa and Bibiani (Western Region), Konongo (Ashanti Region), Dunkwa and Asin Fosu (Central Region), Wa (Upper West Region), Akim Oda (Eastern Region) and Bolgatanga (Upper East Region). The officials staffed at these centres are tasked with confirming that an applicant's plans are accurate, and ensuring everything is place before documentation is forwarded to Accra. For gold, numerous actors, from local chiefs to policemen, aware of the challenges faced and the time it takes for government officials to make decisions on applications, position themselves to extract sums of money from the prospective license holder. As Hilson et al. (2014) have recently reported, for some individuals, operating under the protection of a small-scale mining license has cost tens of thousands of dollars, most of which has taken the form of bribes and payments outside of the law.

Applications must be put forward for not only gold and diamonds but also what the *Minerals and Mining Act 2006* considers 'industrial minerals', including salt, aggregates and clay, although the application process for this starts at the head office of the Minerals Commission in Accra, not necessarily at the district level.¹⁸ If mined on a large scale, these minerals require the issuance of a 'restricted license' (Sections 76-80 of the *Minerals and Mining Act*), which is limited to Ghanaians but can be obtained by a foreigner provided he/she invests a minimum of US\$10 million. There are, however, potentially major bottlenecks with promoting salt, the regulatory framework for which extends beyond the Minerals Commission. The framework for investment in salt, explains Aryada (2009), involves close to 20 agencies, including:

- The Ministry of Lands and Forestry
- Ministry of Mines and Energy
- Lands Commission
- Survey Department
- Land Title Registry
- Department of Town and Country Planning
- Stool Lands Administrator
- Land Valuation Board
- Land Administration Project Unit
- Regional Coordinating Councils

¹⁸ Personal communication, Minerals Commission official, Accra 26 June 2015.

- District Assemblies
- Regional Lands Commission
- Stool Lands Boundary Settlement Commission
- Joint Border Commissions
- Minerals Commission
- Ghana Investment Promotion Centre
- Various informal agencies, namely the National House of Chiefs, Regional House of Chiefs, Traditional Councils, Individual Chiefs, Ghana Institute of Surveyors, and Environmental Protection Agency

Only individuals mining diamonds as tributors on GCD's concession are exempted from this regulatory framework. Here, prospective tributors are required to locate parcels of land and complete an application for the GCD Survey Department, which then carries out inspections. If evaluators are satisfied that the plot is not too close to GCD's machinery, not tapping into its 'reserve' and adequate distance from roads, then approval is given, and ID cards are issued. The tributor is effectively the responsibility of the company (Hilson and Clifford, 2011).

Table 12: Application procedure for a small-scale mining license in Ghana¹⁹

Step 1. Applicant identifies Area of interest	Site Plan / Map/ Geological Info (1:50,000 Scale)
Step 2. Applicant obtains a cartographic search report from the Minerals Commission to determine whether an area of interest is free or incumbent for the applicant to apply for a mineral right.	(a) Site Plan / Map/ Geological Info (1:50,000 Scale) (b) Prescribed Search Fees
Step 3. The Commission conducts a pre-licence site inspection to determine whether it is suitable for mining and verify accuracy of the site plan presented by the applicant.	(a) Site Plan demarcating boundaries of proposed site with type C pillars erected on the concession with the assistance of a licensed surveyor (b) Applicant erects a minimum of 60cm concrete pillars at all the vantage points on the concession boundaries at an interval of 61 meter (c) Evidence of Pre-Licence Inspection Fee payment (d) Pre-Licence Inspection Field Report

¹⁹ 'EServices', www.eservices.gov.gh/MINCOM/SitePages/Guidelines-MiningLicence.aspx (Accessed 3 June 2015).

Step 4. Applicant purchases, completes and submits a Small Scale Mining License Application Form and supporting documents to the District Officer of Minerals Commission	(a) Application form (b) 20 copies of site plan (c) Cartographic Search Report(where applicable) (d) Individual – 2 Passport Size Pictures (e) Group made up of at least 10 members - 2 Passport Size Pictures of each member & a Constitution of the group (f) Co-operative Society - Registration Certificate, Details of Members & Regulations (g) Registered Enterprise/Venture–Certificate of Registration & Form A (h) Registered Company - Certificate of Incorporation, Certificate to Commence Business & Details of Directors. (i) Prescribed Processing fee
Step 5. The Metropolitan/ Municipal/ District (M/M/D) Assembly receives a request from the Minerals Commission to cause a publication of the application to be made in the offices of the M/M/D Chief Executive, the Local Information Center, Magistrate Court, Post Office, and such other places as he/she may deem necessary, for a period of 21 days to afford the general public the opportunity to examine the application and to react if necessary.	Minerals Commission's Request Letter with copies of the application
Step 6. Metropolitan/Municipal/ District (MMD) Chief Executive responds to the Minerals Commission's request	Certificate of Service of the Notice endorsed by only the Metropolitan/ Municipal/ District (MMD) Chief Executive
Step 7. Applicant obtains an Environmental Permit from the Environmental Protection Agency (EPA) and submits to the Minerals Commission	(a) Environmental Permit Request Letter for from the Minerals Commission (b) EPA Environmental Permit Registration Form
Step 8. The Minerals Commission issues an Offer Letter with prescribed fees to be paid by the Applicant	Memos / Reports
Step 9. The Commission prepares the Agreement upon receipt of EPA's Environmental Permit	(a) Environmental Permit
Step 10. Applicant pays prescribed fees and signs his/her part of the Agreement at the Minerals Commission	(a) Letter of Acceptance (b) Evidence of Payment of Consideration Fee to Minerals Commission as stated in the Offer Letter (c) Evidence of Payment of Annual Ground Rent to Administrator of Stool Lands
Step 11. The Commission forwards the signed agreement to the Sector Minister to sign on behalf of the Government of Ghana	Applicant's Signed Agreement
Step 12. Sector Minister reviews and Grants of Mineral Right to Applicant by signing on behalf of the Government of Ghana	Applicant's Signed Agreement

Step 13. On the receipt of the signed Agreement, the applicant is required to send the agreement to the High/ Supreme Court to swear an oath and obtain a Certificate of Proof. The applicant is required to stamp and register the agreement with the Land Valuation Board and Title Deeds Registry, respectively.	Signed Public Agreement (Small Scale Mining Mineral Right)
Step 14. The applicant obtains an Operating Permit from the Inspectorate Division of the Minerals Commission, before any work on the concession area can commence.	(a) Copy of the Registered and Stamped Mineral Right (b) Covering letter from the Commission (c) Environmental permit

11.2.3 Social and Environmental Impacts

In Ghana, the impacts of the small-scale mining have been well-documented, although its positive contributions are often ignored and/or are seriously downplayed. Its two most significant positive impacts in the country have been its contributions to employment and national mineral production. In the case of the former, whilst concise data are unavailable, all signs point to small-scale mining providing direct employment to at least one million Ghanaians, and many millions more in the downstream industries it spawns.

The sector's ability to create jobs in a landscape where, according to the African Development Bank (African Development Bank, 2012), the unemployment rate for youth (people aged 15-24) is 25.6 percent makes it indispensable. As several studies have shown – conducted mainly in gold and diamond mining areas – over the years (Aryee et al., 2003; Banchirigah, 2008; Hilson et al., 2014), small-scale mining is invaluable source of income to, and occasionally a lifeline for, an eclectic group of people, including itinerate farmers, aspiring university students and struggling urban families. The vast majority of these people, however, operate in informal 'spaces' – that is, without a license. At the end of 2014, there were only 600 gold and diamond concession holders, 24 of whom were women (Amankwah et al., 2015a). In addition to one million – mostly unlicensed – small-scale gold and diamond miners, there are, according to Sutton and Kpentey (2012), one million individual 'salt winners', organized into cooperatives, scattered across the Greater Accra Region and Central Region. Whilst this figure may appear to be high, it is likely a conservative estimate, given that access to sea brine is free (Arada, 2009). Women account for a substantial portion of the sector's workforce, including an estimated 22 percent of the people found on licensed concessions, 1.3 percent of gold buyers, half of the people found working in the informal gold and diamond mining economy, 60 percent of those engaged in salt extraction, and 80 percent of stone quarry workers (Amankwah et al., 2015b). Small-scale mine operators account for a substantial share of national mineral production, including 100 percent of diamond output, 30 percent of gold, and most of dimension stone, sand and salt output.

The negative aspects of small-scale mining, however, have received a considerable amount of coverage. Countless studies have been conducted on mercury pollution from small-scale gold mining, as have social issues such as child labour and health and safety concerns (e.g. HRW, 2015). But as Hilson (2013) explains, these 'problems' can largely be thought of as 'expressions' of the sector's informality. Operating outside of the regulatory bracket, these activities are bound to be environmentally-degrading and associated with numerous social 'ills'.

11.2.4 Entrepreneurship: Bringing DM into the Mainstream

One of the more liberalized financial environments in sub-Saharan Africa, Ghana is a fertile setting for transforming DM into an entrepreneurial vehicle. The fees for registration (Table 9) are, at present, mostly out of the reach of prospective licensees. But by solidifying the platform for financial support, these costs would not be so insurmountable. On this possibility, three reflections are offered.

First, Ghana has a long history of encouraging entrepreneurship. Its cooperative movement predates independence, as does its microfinance (Gheneti, 2007; Kessey, 2014). According to official records the colonial government, in the 1930s, introduced legislation to encourage rural farmers to form cooperatives in order to access credit. In the 1950s, credit unions were introduced in the north of the country by missionaries in the localities in which they were stationed. There have since been a number of very significant developments which have solidified the microfinance culture in the country, including (Asiama, 2007):

- The provision of subsidized credits in the 1950s;
- The establishment of the Agricultural Development Bank in 1965, specifically to address the financial needs of fisheries and agriculture;
- The establishment of Rural and Community Banks (RCBs), and the introduction of regulations such as commercial banks being required to set aside 20% of total portfolio, to promote lending to agriculture and small scale industries in the 1970s and early 1980s;
- Shifting from a restrictive financial sector regime to a liberalized regime in 1986;
- Implementation of PNDC Law 328 in 1991 to allow the establishment of different categories of non-bank financial institutions, including organizations which supply savings and loans, and credit unions.

Second, there are a host of organizations now in place which act as vehicles to promote small-scale industrial development and entrepreneurship. Heading the list is the National Board for Small-Scale Industries (NBSSI), a non-profit public sector organization, established in 1985, which operates under the Ministry of Trade, Industry and Presidential Special Initiatives. Seeking to develop business services for micro and small enterprises, NBSSI has

secretariats in all 10 district capitals of the country.²⁰ There is also the NGO, the Ghana Association of Women Entrepreneurs (GAWE), an association of self-employed women manufacturers and exporters of goods and services established in 1991, and an affiliate of the African Federation of Women Entrepreneurs,²¹ as well as the Ghana Microfinance Institutions Network (GHAMFIN),²² an informal network of institutions and individuals that operate within the country's microfinance industry, concerned with the delivery of best practices in the microfinance sector.

Finally, there is the support for the small-scale mining sector itself, though most of this support has been for small-scale gold miners, as distinct from miners of DM. Hilson and Ackah-Baidoo (2011) provide an extensive list of the attempts made in the country to provide microcredit services to the country's small-scale miners, one of the most comprehensive efforts being the moves made by the Ministry of Finance and Minerals Commission to provide loans to groups of miners across the country to acquire equipment. To date, US\$700,000 in loans have been dispensed. If passed, the *Minerals Development Fund Bill* would no doubt catalyze complementary lending by making provision for a mining community development scheme, a platform that could be used to establish microcredit services for small-scale mining. At present, individuals are forced to approach various microfinance institutions and banks, who commonly lend money to miners but demand significant collateral up front – forcing people to use their houses and cars as collateral – as well as high interest repayments (Amankwah et al., 2015a, 2015b; Hilson and Hilson, 2015).

Although it is woefully underfunded, The Ghana National Association of Small-Scale Miners could be used as a vehicle to bring a lot of these initiatives to fruition. Various reincarnations of a national small-scale mining association have been supported over the years, principally by the World Bank. The challenge now is ensuring that the association has sufficient enough voice nationally, and is not undermined by the frictions between the various regional mining factions.

²⁰ 'National Board for Small Scale Industries', <http://www.nbssi.org/> (Accessed 12 May 2015).

²¹ 'GAWE', www.ghanawomenentrepreneurs.org/aboutgawe/aboutgawe51 (Accessed 3 May 2015).

²² 'GHAMFIN', www.ghamfin.org/microfinance/ (Accessed 3 May 2015).

Table 13: Miscellaneous licensing fees for small-scale mining in Ghana²³

Application Forms	Cost in Ghana cedis (Unless Specified Otherwise)
Small Scale Diamond & Gold Application Form with guidelines	100
Small Scale Sand & Gravel Application Form with guidelines	100
Processing Fees	
Gold and Diamonds (Small-Scale)	250
Renewal Gold and Diamonds	250
Sand and Gravel	200
Renewal Sand and Gravel	200
Quarry (Individual)	200
Renewal Quarry (Individual)	200
Salt	500 (Company), 200 (Individual)
Renewal Salt	500 (Company), 200 (Individual)
Consideration Fees	
Gold/Diamonds License/Renewal	550
Small-Scale Mining Licenses	
Quarry/Salt License/Renewal	500 (Individual), 3000 (Company)
Clay License/Renewal	200 (Individual), 2000 (Company)
Sand/Gravel License/Renewal	500 (Individual), 2000 (Company)
Searches	
Cartographic	50
Legal	US\$500
Request for Information	US\$100

11.3 Nigeria

The growth of Nigeria's DM sector has been hamstrung by the country's overdependence on oil. Today, over 80 percent of the government's revenues are derived from oil (de Witt and Crookes, 2013). Given the rampant corruption in government, the proliferation of weak institutions and, by extension, the lack of political will to develop other industries to help offset this unhealthy overreliance, this dependency will likely continue.

²³ 'EServices' www.eservices.gov.gh/MINCOM/Documents/MINERALS%20COMMISSION%20FEES.pdf (Accessed 12 June 2015).

The fixation on oil and its impacts has overshadowed important aspects of Nigeria's economic history, foremost – and of particular relevance to this report – how the country was once a major producer of solid minerals. The most significant and indeed most explored branch of its mining sector has been tin: Nigeria was a world class producer of the metal during the colonial period, the alluvial and elluvial deposits found in its Jos Plateau becoming an important source of raw material, particularly during World War I and World War II. By the 1940s, Nigeria's tin mining sector employed nearly 100,000 people (Fell, 1939; Breckenridge, 2008), and continued to be a significant industry up until the onset of the oil crisis in the 1970s.

In fact, prior to oil's rapid ascent on its economic development agenda, Nigeria was a major exporter of tin, as well as coal and columbite. But Nigeria hosts 40 different mineral types, including gold, barite, bentonite, limestone, bitumen, iron ore, lead/zinc, barites, gemstones, granite, marble, gypsum, talc, iron ore, lead, lithium and silver. With the price of oil having experienced a precipitous decline, and the government seemingly committed to diversifying the country's natural resources portfolio, it is now an opportune time to put DM on 'the map'.

Despite its obvious importance, Nigeria's mining sector has gone virtually unexamined in the literature. The material that has been published – from which an effort was made here to assemble a case study – can be placed into three separate categories: analysis which captures the historical dimensions of the sector, providing an illustrative picture of its dynamics pre-oil and, ultimately, what it could become with the requisite level of support and political will; a series of donor, government and NGO reports which offer important clues about the regulations and policies in place for the sector; and a wave of – predominantly online – journal articles, which, apart from describing the location of activities, shed very little light on, *inter alia*, why people are mining, the activities' links with agriculture, and the drivers of the sector's informality. A large share of the analysis presented in the latter focuses on the environmental impacts of small-scale gold mining, in response to the outbreak of lead poisoning linked to activities in Zamfara State (see HRW, 2011; Goldman et al., 2014).

11.3.1 Overview of Nigeria's Mining Sector

Very little has been produced in the past decade that provides insight on the dynamics of DM in Nigeria. One of the more useful documents, a baseline report (Hipwell et al., 2008) published on behalf of the World Bank by the international consultancy, Wardell Armstrong, in 2008 but which presumably drew on material gathered as early as two years' prior, is relied on heavily here. Whilst the document is extremely useful, given the sharp increases in commodity prices that have since taken place, in all likelihood, a large percentage of the information it contains is now heavily outdated. A second particularly informative document is the government's 'ASM Handbook' (Government of Nigeria, 2011), which presents detailed information about the institutional structures in place for small-scale mining in the country, as well as provides critical reflections on the sector's organizational dynamics and impacts.

This section of the report draws heavily on these two sources.

The latter document summarizes, succinctly, how policy conceptualizes small-scale mining in Nigeria. According to the *Minerals and Mining Act, 2007*, 'artisanal mining' is activity 'limited to the utilisation of non-mechanised methods of reconnaissance, exploration, extraction and processing of mineral resources within a small-scale mining lease area', whilst 'small-scale mining' is 'Artisanal, alluvial and other forms of mining operations involving the use of low-level technology or application of methods not requiring substantial expenditure for the Conduct of Mining Operations within Small-Scale Lease Areas'. The Artisanal and Small-Scale Mining Department in the Ministry of Mines and Steel Development – this government department and the abovementioned law being integral pieces of a sound institutional framework for small-scale mining that will be discussed at great length in Section 10.3.4 – places, in the broad category, 'artisanal and small-scale mining activity', activities which exploit marginal or small mineral deposits, have low levels of mechanization, have unskilled personnel involved at all levels of operation, inefficient mining and processing techniques, low levels of production, poor access to markets and support services, a chronic lack of investment capital, low levels of consideration to health and safety, have significant negative impact on the environment, low levels of income amongst operators, operate without legal mining titles, have gender issues and child labour, and are the locations of community-level conflict. In line with the views expressed in this document, this is the type of activity generally found in locations where small-scale mining is confined to informal 'spaces': up to 95 percent of Nigeria's small-scale mining activities are unlicensed.

But despite these problems, the sector is extremely important economically. According to the former document, it accounts for over 90 percent of solid mineral production in Nigeria. It also claims that the sector employs at least 200,000 people directly, although this seems like an extremely conservative estimate, given Nigeria's mammoth population (200 million people) and that activities are found scattered across all 33 of its states (Table 10). Although there are no precise data available, from the anecdotes scattered across the website, the testimonials provided in NGO reports and the small unsubstantiated passages contained key government documents, there are significant numbers of women and children found in Nigeria's small-scale mining economy. The broad consensus is that this is due to the need for families to supplement income: most work seems to be casual, and is compensated for daily.

Hipwell et al. (2008) do draw some particularly interesting conclusions, based on their own research, about the drivers of peoples' participation in informal mining activity in Nigeria – findings which reinforce the main reasons cited in the general literature concerning the main drivers of illegal small-scale mining activity. The reasons given are as follows:

- Prohibitive costs with cooperative registration, lease application fees and payments for leases;

- Time taken to register a cooperative (1-2 years);
- Delays in the application process (hundreds of applications awaiting ministerial approval); and
- Lengthy distances to the relevant offices to acquire information about registration, as well as the need to travel to Abuja to register.

Given the ongoing preoccupation with oil and the historic lack of interest at the policymaking level in mining in the country, it is unlikely that any of these issues have been addressed.

Perhaps the most significant insight provided by Hipwell et al. (2008) is a – likely oversimplified – typology of peoples' rationale for participating in small-scale mining in Nigeria's three main cultural spheres. The first is the South West, which is dominated by Yoruba indigenes and where there is a strong link to formal education. Here, the authors conclude that the sector's domination by Northern migrants and their occupation of positions which indigenes would normally occupy is owed to the latter's pursuit of a formal education and work in the formal sector in towns and cities. In the South East Igbo-dominated areas of the country, many youth consulted by the authors claimed they were working at mines in order to further their education; here, according to the authors, there are fewer migrants. Finally, in the Hausa-dominated Northwest, cultural practices seem to influence the organizational structures of sites: many sites forbid women from mining, and female children work alongside their fathers or with other children from the community at sites.

Table 14: Minerals mined on a small scale in Nigeria

State	Minerals
ABIA	Glass sand, limestone, salt, shale, ballclay, galena, granite, marble, laterite, bentonite, phosphate, kaolin, pyrite, feldspar, petroleum, lignite, gypsum, sphalerite,
ADAMAWA	Granite, clay, gypsum, limestone, uranium, kaolin, coal, trona, barite, marble, magnesite, laterite
AKWA-IBOM	Clay, sand, granite, coal, petroleum, natural gas, kaolin, limestone, lignite
ANAMBRA	Clay, iron stone, natural gas, petroleum, sandstone, kaolin, pyrite, lignite
BAUCHI	Kaolin, trona, gypsum, cassiterite, mica, clay, tantalite, galena, gemstone, sphalerite, sand, barite, columbite, zinc, lead, monazite, feldspar, graphite, wolfram, coal, agate, tantalite, rutile, tungsten, copper, talc, ilmenite, zircon
BAYELSA	Salt, petroleum, natural gas, silicasand, Bentonite, petroleum, limestone, glasssand
BENUE	Gemstone, barites, feldspar, marble, mica, galena, sphalerite, sand, clay, coal, gypsum, kaolin, anhydrite, brick clay, crushed and dimension stone, fluorspar, wolframite, bauxite, magnetite. Ilmenite
BORNO	Silicasand, natural salt, sapphire, topaz, mica, gypsum, feldspar, granite, potash aquamarine, limestone, kaolin, bentonite, laterite, refractory clay, trona, gold, cassiterite

CROSS -RIVER	Salt, limestone, coal, manganese, mica, ilmenite, gold, quartz, glasssand, tourmaline, petroleum, natural gas, kaolin, mica, clay, spring water, talc, granite, galena, cassiterite, goethite, uranium, barites
DELTA	Kaolin, gravel, sand, natural gas, petroleum, ballclay, bauxite, granite, clay, spring water
EBONYI	Sphalerite/Galena, salt, limestone, ballclay, refractory clay, gypsum, granite
EDO	Copper, gold, marble, granite, gypsum, petroleum, lignite, limestone, ceramic clay
EKITI	Clay, quartzite, lignite, limestone, granite, gemstone, bauxite, cassiterite, columbite, tantalite, feldspar, kaolin
ENUGU	Crude oil, ballclay, iron-ore, petroleum, gypsum, coal, sand, ceramic clay
FCT	Kaolin, limestone, granite, marble, feldspar, mica, dolomite, clay, sand, talc
GOMBE	Graphite, kaolin, limestone, sand, uranium, coal, halite, clay, gypsum, granite
IMO	Crude oil, shale, natural gas, kaolin, sand, limestone, salt, marble,
JIGAWA	Glasssand, granite, clay, kaolin, iron ore, quartz, potash, talc, limestone
KADUNA	Muscovite, granite, gold, manganese, clay, graphite, sand, zircon, kyanite, cassiterite, ilmenite, gemstone, columbite
KANO	Clay, laterite, cassiterite, columbite, ilmenite, galena, kaolin, gemstone, silica, monazite, wolframite, thorium, granite, hyalite, beryl, amethyst, gold
KATSINA	Gold, Manganese, feldspar, black tourmaline, amethyst, quartz, kaolin, mica, gypsum, silimanite, clay, granite, sand, uranium, asbestos, tourmaline, serpentine chromite, ilmenite, diamond, graphite, iron ore, potash,
KEBBI	Salt, iron ore, gold, feldspar, limestone, quartz, bauxitic clay, manganese, kaolin, mica
KOGI	Clay, iron ore, gemstone, marble, limestone, feldspar, dolomite, phosphate, mica, cassiterite, granite, coal, kaolin
KWARA	Clay, kaolin, sand, quartz, dolomite, marble, feldspar, gold, tantalite, cassiterite, granite, limestone, tantalite
LAGOS	Sand, bitumen, gravel, petroleum, laterite
NASSARAWA	Cassiterite, gemstone, amethyst, beryl, chrysolite, emerald, garnet, sapphire, topaz, barites, galena, monazite, zircon, glasssand, coal
NIGER	Ballclay, kaolin, limestone, granite, glasssand, iron ore, red clay, feldspar, gold, graphite, kyanite, quartz, asbestos, marble, talc, gemstone
OGUN	Kaolin, feldspar, silicasand, mica, granite, clay, phosphate, gypsum, limestone, quartz, tar sand
ONDO	Marble, gold, gemstone, clay, diorite, lignite
OSUN	Clay, granite, talc, dolomite, ilmenite, feldspar, quartz, limestone, mica, clay, gold
OYO	Clay, feldspar, granite, ilmenite, iron ore, kaolin, quartz, talc, marble, dolomite, tourmaline, aquamarine, amethyst
PLATEAU	Monazite, columbite, feldspar, clay, cassiterite, gemstone, kaolin, dolomite, mica, zircon, marble, ilmenite, barites, quartz, talc, galena
RIVERS	Petroleum, natural gas, sand, clay

SOKOTO	Silicasand, clay, salt, limestone, phosphate, gypsum, kaolin, laterite, potash, granite
TARABA	Fluorspar, garnet, tourmaline, sapphire, neon, tantalite, columbite, cassiterite, barite, galena, gypsum, limestone, laterite, calcite, bauxite, magnetite, pyrite, lead/zinc ore
YOBE	Salt, trona, diatomite, clay, gypsum, kaolin, silicasand, limestone, iron ore, shale, uranium, granite, bentonitic clay
ZAMFARA	Gold, granite, chromite, charnockite, clay, feldspar, spring water

Source: Adekeye, 2010

The organizational structures of activities do, however, seem to vary across the country, depending on the type of mineral being extracted, the nature of involvement in mining and the size of the operation. Whilst a number of mines are very old, other are not yet formally registered but nevertheless may have well-developed structures of management organization and hierarchies, as well as labour management through unions and support systems. A typical setup is comprised of the mine director, the mine manager, and finally, the labourers, who comprise the largest group of in the workforce. There are both established mine sites as well as additional rush sites which surface following the discovery of a mineral deposit.

11.3.3 Demand and Supply Issues

Among ACP countries, Nigeria's DM economy could be the most underutilized. With a swelling population and accompanying construction boom, there are clearly innumerable opportunities to link local producers to domestic markets. Despite the largely illegal nature of small-scale mining, there is a high demand for the minerals produced by the sector.

This leads back to points raised by Hipwell et al. (2008). From this analysis, and as further affirmed by claims made across media sources, it would appear that in the case of DM markets, Nigeria's situation mirrors that of most other ACP countries. On the one hand, there is the quarrying segment – or 'construction materials' – which are, indeed, finding their way into these domestic markets. Occasionally, there are sites populated by both foreign and local buyers, such as the mines in Mabu (Kebbi State) and on the Mambilla Plateau (Lawal 2006). The problem is, of course, that there is insufficient supply and possibly, materials of questionable quality being sold at these sites to lay a foundation for a vibrant domestic construction materials sector. But the variation in quality and unpredictable yields are to be expected from a sector populated almost exclusively by informal activities. On the other hand, there are the more 'export'-type commodities, such as gold and gemstones, the supply chains for which there are sparingly few details available. These chains, however, are, not surprisingly, 'choked' with middlemen. Often, labourers are paid directly by the buyers who come directly to the site, including individuals for metallic minerals and gemstones, or groups with tippers for construction and industrial minerals. For gemstones, the supporters are often linked to larger buying centres, themselves sponsored by an onward chain of people.

The supporter provides financing for the operation and then buys the minerals when they are recovered, to sell on to the buying centre.

Can value chains be formalized? With the high demand for minerals, many value chains appear to be highly-elaborate in their structure, comprised of several players, all of whom are looking to benefit from the harvested commodity. For instance, in the case of gold, currently, only registered mineral buying centres are licensed to purchase from artisanal miners; yet even for the buyers it is difficult to get registered (Goldman et al., 2014), which results in miners turning to other readily-available avenues to sell their minerals.

11.3.4 Mines and Quarry Management

Where Nigeria does have a distinct advantage over other ACP countries is with its regulatory, institutional and policy framework. In many respects, it is unrivalled, containing more separate areas for DM and small-scale mining than perhaps any other. Of course, the capacity and drive to regulate the sector is lacking but this again can be attributed to the preoccupation with oil extraction and failure to channel revenues from that sector into other parts of the economy.

Most of the recent improvements made to Nigeria's institutional and regulatory framework were made under the auspices of the World Bank's US\$127 million Sustainable Management of Mineral Resources Project (World Bank, 2004), which earmarked one third of funds (US\$48.90 million) for 'Economic Development and livelihood diversification in Artisanal and Small-scale Mining Areas'. The Ministry of Mines and Steel Development (MMSD) is the ministry which oversees the development of the mining sector in Nigeria. It comprises of the following departments: the Mine Cadastre Office (MCO), Mines Inspectorate Department (MID), the Mines Environmental Compliance Department (MECD), Nigerian Geological Survey Agency (NGSA) and the Artisanal and Small-Scale Mining Department, which oversees what the UN defines as the DM sector.

The MMSD administers *Minerals and Mining Act, 2007* and the 2011 *Minerals and Mining Regulations*. The former guides mining sector development in Nigeria. Although most of it emphasizes large-scale development, it has specific provisions for small-scale mining. It, along with artisanal mining, is covered by the Small Scale Mining Lease (SSML), and permits the holder the right to exploit minerals in an area between 5 acres and 3 km², using low level technology or the application of methods not requiring substantial expenditure. A Quarry Lease gives holders the right to remove and dispose of any quarried minerals, including necessary excavation and construction, in area not exceeding 5 km². While the provisions are applicable to small-scale mining, the conditions are more relevant to more advanced small-scale mining. For instance, to apply for a SSML, the application must be accompanied by proof of technical competence and financial capability, which are usually out of reach for artisanal miners.

In addition, the Mining Cadastre Office encourages the formation of cooperatives in order to decrease transaction costs with formalization. The few who have the means to obtain a license seem to be the only ones benefitting.

11.3.5 Environment, Health and Safety Concerns

In Nigeria, the mining sector causes a range of environmental problems, although land degradation is by far the most significant. Due to the migratory nature of miners, sites are typically stripped of vegetation and topsoil, and open pits are abandoned, which renders land unusable for other activities. Siltation and destruction of aquatic environments is also common. Formalization could go a long way toward training these miners in environmental management and facilitate the adoption of 'best practices' in this area.

All leaseholders are required to complete an Environmental Impact Assessment (EIA), which is a highly-unrealistic expectation for the vast majority, who are unskilled. This is a formidable barrier for most, and is likely perpetuating the country's illegal mining 'problem'. In the absence of a consistent regulatory and monitoring presence, most sites are characterized by poor health and safety standards, as the miners operate without proper guidance and training. While the Mine Inspectorate is mandated to ensure compliance, rampant illegality and continued land degradation suggests that it is struggling to fulfil these duties.

11.3.6 Entrepreneurship Skills

What scope is there for promoting DM as a vehicle for economic change in Nigeria? There may not be a more opportune time to do so, with oil prices having plummeted and the government finally recognizing the need to find some alternative revenue streams. What groundwork is in place?

First, and very importantly, there are mining associations covering various mineral types. The list includes Cross River Cross River Barite, Bentonite Producers Association, Edo Sand Producers Association in the South West, and the Association of Tipper and Quarry owners. These associations provide a mouthpiece for operators, in the process strengthening their voices. In some areas, if people do not join an association, they are not permitted to operate

Second, 'small-scale mining' finally appears to be receiving some traction in policymaking circles, which bodes well for the sector's development. Significantly, small-scale mining was mentioned for the first time in a development context in the National Economic Empowerment and Development Strategy 2005. Furthermore, the National Minerals and Metals Policy (2008) also recognizes that the sector accounts for a large percentage of mining operations in Nigeria and reaffirms the government's commitment to supporting the sector's operators. This could be an important starting point in laying the foundation for support for the sector moving forward. There also seems to be some recognition at the policymaking level that illegal mining is preventing DM from realizing its full potential.

If promoted properly, DM could facilitate import substitution. But how willing is the government to embrace this? In the past it has appeared ambivalent on the idea: although the abovementioned changes will no doubt go a long way toward legitimizing small-scale mining as a topic in development moving forward, the government has made other questionable moves which threaten to undermine these efforts. Notably, it introduced waivers on imported raw materials such as gypsum, barite and bentonite in order to meet the demand of the cement and oil industries. This, however, presents problems for local businesses as even where their products do meet the quality standards, local miners often experience a drastic fall in demand for their mineral products (Hipwell et al., 2008). This also affects the communities where minerals are mined.

11.3.7 Geo-data and Maps design

The Nigerian Geological Survey Agency was established to provide geological data/information and services to potential investors. Given this orientation, smaller operators find it difficult to access geodata. Overall, their geological knowledge is very minimal. They rely on past-experience, instinct and superstitious *juju* to locate and pursue the mineralised orebodies, which perpetuates haphazard and dangerous mining, results in low recovery and leads to wastage of product (Hipwell et al., 2008). With small-scale miners supplying most of the country's minerals, however, it would be worthwhile for this department to ensure that they make available quality geodata and simplified maps that are accessible to the small operator. This was supposed to be done under the World Bank project.

11.3.8 Community relations and addressing grievances

To ensure that relations between miners and communities remain cordial and peaceful, and that activities bring benefits to communities, the *Minerals and Mining Act 2007* has among its conditions the formulation of a Community Development Agreement (CDA). This is an agreement reached between the members of the community and the company/organization looking to mine in the area. While this is a good move, the code does not detail what the agreement should include and how it should be implemented, monitored and evaluated. This suggests that legislation is put in place without serious consideration of its implementation and practicality, reinforcing the point raised earlier about the soundness of the sector's regulatory framework on paper but the lack of will to enforce regulations.

Apart from what is stipulated in the policy, the Ministry of Mines and Steel Development has also attempted to make available improved mining technologies in areas known for having unsafe practices. For instance, in Zamfara state, where the lead poisoning occurred, government officials have been encouraging Miners to use iGoli and wet milling machines. Whilst a positive step, these machines are not locally manufactured: they were donated by the South African Government (Human Rights Watch 2011; Goldman et al., 2014).

In some areas, for instance Yala, while communities have been eager to embrace the

cooperative formation approach advocated by the government, feedback is not provided in a timely manner. The government has rather awarded the same piece of land to a mining company which eventually restricts small-scale operator's access to the land (see Hipwell et al. 2008). The delays and lack of follow-up on the part of the government also lead to the escalation of conflict. Allowing communities to form cooperatives can also help provide them with a voice and empower them to manage and support their own communities. However, caution must also be taken to ensure that cooperatives do not stifle the voices of others.

11.4 Guyana

Guyana is an inspirational case for any ACP country. Since the mid-1990s, in response to the cyanide spill at its Omai Mine, the government has made a concerted effort to prioritize and nurture the development of indigenous small and medium-scale mining activity. For nearly 20 years, there has been no trace of large-scale gold mining activity, and if it were not for the arrival of Canada-based Guyana Goldfields, which is planning to develop its exploration works into a mine with the aim of commencing operations in 2015, there may have not been for 20 more. Whilst the Development Minerals Programme is focussed on the mining of industrial minerals, construction materials, dimension stones and semi-precious stones, lessons can be drawn from Guyana's small-scale gold mining industry because it is proof of what can be achieved when the sector's development is prioritized heavily in policy, and a space for making this happen is created. For this reason alone, the case of Guyana has enormous application here.

11.4.1 Background

The development of Guyana, a former British colony, occurred on the back of the sugar industry. Mining was initially an afterthought, undertaken solely by adventurous prospectors who ventured into the country's interior in search of riches. These periodic migrations would occur more regularly over time, resulting in the establishment of satellite towns and eventually, permanent mining outposts and commuter towns such as Bartica and Madhia. In the past two decades, this sugar outpost, despite the favourable trade links negotiated with the EU at Contonou, has, almost on its own, become a mining economy.

Traditional gold mining in Guyana (also referred to as *porknocking*) involves simple implements such as buckets, sifters and pans. Although *porknockers* are still widespread, most of the country's small-scale miners operate legally. In fact, since 2005, the number of claims has increased by more than 50 percent, and there has been a three-fold increase in the number of registered river dredging operations (at the time of writing there were more than 12,000 registered dredges), a testament to the priority given to small-scale mining in policy and the institutional structure now in place to support the industry's growth and development (examined in greater detail in Section 10.4.3). In 2013, Guyana recorded its highest level

of gold production, at 458,105 oz, up from 438,645 oz in 2012 and 363,083 oz in 2011.²⁴ Between 2007 and 2011, declared gold production increased nearly 50 percent, and revenue from the sector increased 30 percent annually, from US\$170 million to more than US\$570 million (Inter American Development Bank, 2013). Diamond production has increased steadily alongside this rise in gold production. The latest figures, for 2013, place the total value of collected diamonds at US\$12,311,628.40 (60,392.65 carats), a dramatic increase from the US\$7,653,786.91 (44,244.07 carats) collected in 2012.²⁵ What is most impressive about this production is that it is, again, solely the combined output from indigenous small and medium-scale miners. Some work independently whilst others are sponsored by larger operators. Their mining methods vary, depending on the characteristics of the ore body being worked, the geography, accessibility and location. Whilst estimates vary, there could be upward of 100,000 people directly engaged in Guyana's mining sector, and countless more in downstream service industries. This is significant given that the country is home to only 750,000 people.

The Government of Guyana has used the economic platform provided by gold mining to explore possibilities to develop other branches of the mining sector. There are, for example, considerable opportunities to develop 'construction materials.' Guyana has well-established quarries scattered across the country, including the St Mary's Quarry, established in 1956, along the Essequibo River near Bartica, and the Tipero Stone Quarries in the Cuyuni-Mazaruni Region. But as in the case in so many other ACP countries, the lack of readily-available aggregates has proved crippling for development. Former Natural Resources and Environment Minister Robert Persaud expressed concern about this poor productivity, reflecting on how the government has a sizable road program in the works, as well as a series of planned sea and river defence projects, which will require a steady stream of materials.²⁶ This could explain why, on the website of the Guyana Geology and Mines Commission, there is a presentation, put together by its Commissioner, which offers insights on the country's 'alternative' mineral potential. Examples include kaolinite in Linden; nickel in the Kauremembu Blue Mountains; molybdenum in Ianna Hill; kyanite in Karani/Camp Creek; tantalum in Minabaru Creek and Yorke and Arawapal Creeks; and chromite in Coral Snake Creek.

11.4.2 Demand and Supply Issues

Guyana's (revived) large scale-mining sector is in incipient stages; as indicated, the country currently largely depends on its small and medium scale sector for mineral production. Thus demand for minerals produced by the small-scale sector has been high. The government

²⁴ 'Guyana records highest ever gold declaration', <http://guyanachronicle.com/guyana-records-highest-ever-gold-declaration/> (Accessed 12 June 2015).

²⁵ 'Guyana', <http://www.kimberleyprocess.com/en/guyana> (Accessed 1 June 2015).

²⁶ 'Persaud concerned about low quarry production', www.guyanatimesgy.com/2014/02/27/persaud-concerned-about-low-quarry-production/ (Accessed 4 June 2015).

has also been able to capture a significant part of the benefits, through the established markets. For instance, in the case of gold and diamonds, the Guyana Gold Board (GGB) is the main legally-mandated buyer. In recent years, regulations have also made provisions for other licensed buyers for various minerals (Thomas 2009). Hence, the small-scale mining sector has contributed massively to national GDP. For instance, in the first half of 2014 alone, mining and quarrying accounted for 11 percent of GDP, with gold (mined by the ASM sector) alone accounting for 9.6 percent of GDP (UNDP, 2015). Sand mining carried out on a small scale for the domestic market has also been thriving and contributes to the export market. For instance, in 2013, 7 percent of the overall sand produced was exported to the United States of America, St Lucia and Granada, among other destinations. The main market for sand, however, continues to be the domestic construction sector.

Moreover, and as hinted at earlier, due to increased demand, the production of quarried stones has also been on the increase. For instance, it increased from 340,000 t in 2009 to 655,000 t in 2013. Loam production has also risen over the years, increasing from 2000 tons in 2009 to 94,000 tons in 2013. Loam mining is carried out by small and medium scale miners and its main use is in road building (Thomas, 2009).

11.4.3. Mines and Quarry Management

Guyana also deserves praise for having in place a very effective legislative and institutional framework for small-scale mining. The Ministry of Natural Resources and the Environment is the key ministry overseeing the development of the mining sector in the country. It is the umbrella body under which the GGMC and GGB fall. It also oversees other government agencies such as the Guyana Forestry Commission (GFC), Guyana Lands and Surveys Commission (GLSC), Environmental Protection Agency (EPA), Guyana Wildlife Division (GWD), National Parks Commission (NPC) and Protected Areas Commission (PAC). The GGMC Commissioner grants permission to prospect and mine. The organization also acts as a national repository for information on mineral resources, advises the government on mineral policy, and in general promotes mine-related development.

Unlike most countries where small-scale mining is carried out, in Guyana, the government seems to have some control over activities. The GGMC is very active on the ground and involved in the lives of operators: it has a presence both on the coastal (administrative) and in the interior (operational) sections of the country. A decentralized GGMC platform has put the government in a good position to regulate activities fairly effectively. The *Mining Act 1989* (Guyana Act No. 20 of 1989) is the main piece of legislation guiding the development of the mining sector. It is supported by the *Mining Regulations* (1979) which outline provisions related to the mining of metals, minerals and precious stones and are updated through amendments periodically. The *Mining Act 1989* also works in tandem with other pieces of legislation, including the *Environmental Protection Act* (1996), The *Guyana Gold Board Act* (1981) and the *Amerindian Act* (2006).

The *Mining Act 1989* defines three scales of mining operations, namely 'small scale', 'medium scale' and 'large scale'. The 'small-scale mining' category is most relevant to DM. A claim under this category covers an area of 1500 feet by 800 feet or a river claim, which covers one mile of a navigable river. A mine that excavates or processes material between 20m³ and 200m³ in a 24-hour period is also referred to as 'small-scale' and licenses for this category are restricted to Guyanese citizens. Foreigners can only participate through a joint venture with local partners. Another important piece of legislation is the *Amerindian Act* (2006), which allows Amerindian communities – which constitute 10% of Guyana's total and in many cases 50% of the population in the interior mining regions – to maintain exclusive rights over their titled land. The law requires miners to seek permission from the village council, as well as pay a minimum of 7 percent of the value of mineral extracted from the mine to the village. Moreover, and as indicated earlier in this report, Guyana also has one of the strongest and most influential small-scale mining associations in the world: the Guyana Gold and Diamond Mining Association (GGDMA). It represents the interests of the local mining community, and is comprised of a wide range of operators.

Whilst the relevant institutions are in place to help in the management of the small-scale mining, the absence of a mining policy has hampered progress. Moreover, as the GGMC is overburdened with other responsibilities, if other institutions are brought into the fold, perhaps the sector could develop more sustainably and efficiently. As decentralized as the GGMC is, in some areas, it still struggles in remote areas to enforce laws and ensure that operators improve their mining practices. With the mining regulatory system relying on the actions of GGMC field officers, who are few in number, underpaid and overburdened with several responsibilities, it is not surprising that the regulatory apparatus is dysfunctional at times (IHRC 2007). But despite these setbacks and challenges, Guyana does have the foundation for one of the more effective small-scale mining policy and regulatory frameworks in place.

11.4.4. Environment, Health and Safety Concerns

In terms of environmental, health and safety issues, the gold sector does not set a good example for the DM sector to follow. Mercury is commonly used in amalgamation processes at small-scale gold mines. This has resulted in widespread contamination across the country's interior. On a positive note, the government has made a concerted effort to address the problem. There are ongoing efforts to eliminate the use of mercury in line with the conditions under the Minamata Convention, initiatives which build on excellent training provided by the NGO community in collaboration with government. Efforts are also focusing on improving recovery rates through physical separation (Projekt Consult 2013; IHRC 2007). These efforts very importantly underscore the responsiveness of the government and partners to contamination concerns in the mining sector, which bodes well for the environmental regulation of an expanded mining economy moving forward.

Apart from poor practices in the mining of gold, the mining of other minerals, including sand, and the clearing of lands for quarrying has also led to increased erosion; the runoff of sediments from overburden and sedimentation in rivers is common (see UNDP 2015). The obvious concern is that activities take place in the ecologically-diverse interior of the country. Deforestation is inevitable, the removal of cover causing significant soil erosion and a loss of nutrients.

11.4.5 Community relations and addressing grievances

Here is where Guyana has experienced problems. In the process of promoting its small-scale mining sector, the government has faced resistance from the Amerindian groups that inhabit the interior. Small-scale mining, particularly for high value commodities like gold, which encourage internal migration, poses especially high risks to Amerindians and the natural environments on which they subsist for their livelihoods (IHRC 2007). The government did implement the *Amerindian Act* in 2006 which provides indigenous communities with some protection (UNDP 2015), including permission for Amerindian groups to maintain exclusive rights over their titled land. As indicated, it mandates miners to seek permission from the village council, as well as pays a minimum of 7 percent of the value extracted from the mine to the village. Provisions of the *Amerindian Act* are contingent upon land titling. However, disputes still arise as the government sometimes issue permits to miners to prospect and mine in some of these lands; not surprisingly, many disputes have surfaced over the years. Despite being aware of the disputes, the government tends to ignore them.

The government is unable to conduct accurate surveys of land in the interior in order to determine which pieces of land are being contested. Furthermore, it has refused to rely on detailed and accurate maps created by communities (IHRC 2007). Consequently, some communities are adopting rules to prohibit all mining on their lands apart from traditional artisanal mining and are seeking support to adopt low impact mining methods (Griffiths and Anselmo 2010). Whilst there are attempts to promote the rights of the indigenous communities, more has to be done in enforcing the policies and legislation to ensure that their rights are not infringed and there is peaceful co-existence between miners and their communities.

11.5 Papua New Guinea

11.5.1 Overview of PNG's Small-scale Mining Sector

Small-scale mining has been carried out in Papua New Guinea since 1888 (see Crispin 2003; Moretti 2007). There are generally three different types of small-scale mining activities found in the country: 1) those which occur within the boundaries of a large-scale mining lease; 2) activities which occur on customary land; and 3) activities found on traditional lands acquired and provided to operators by the government. However, each context presents its own set of challenges.

Papua New Guinea's small- and medium-scale mining sector is extremely diverse. It includes hard rock quarrying, which is widespread across the country; the mining of sand, gravel as well as the extraction of boulders in major rivers as well as in small streams; and small-scale gold mining. Most individuals engaged in small-scale mining do so illegally, and with basic implements. For example, in the case of artisanal gold mining, approximately 85-90 percent of operators use simple panning dishes or sluice boxes without any mechanized assistance aids; another 9-10 percent engage in semi-mechanised activity, making use of portable equipment such as pontoon dredges, hydraulic sluice pumps, and sluice boxes; and the remaining 1 percent use mechanized methods of mining (Javia and Siop 2010). Small-scale mining activity is most widespread in the country's remote rural areas. There are no disaggregated data on the number of people engaged in small-scale mining, although it has been estimated that between 50,000 and 100,000 people are employed directly. According to analysis of the country's small-scale mining demographics, 50 percent of the sector's participants are adult males, 20 percent adult females, and the balance school-aged children under the age of 16 (Crispin 2003; Moretti 2007; Javia and Siop 2010).

11.5.2 Demand and Supply Issues

In addition to small-scale mining providing employment to tens of thousands of people, the Government of Papua New Guinea benefits tremendously from activities. In the case of gold, in 2011 alone, production was an estimated 8 t, accounting for 4 percent of national GDP (see Mek 2011). These benefits would be even greater if the sector was properly formalized.

Given the widespread nature of its activities and the variety of minerals being mined, there are numerous opportunities to feed a range of supply chains. Many of these opportunities lie on its own shores: the country has the highest demand for minerals produced by small-scale mining in the entire Pacific region. A potentially important destination for product originating from the DM sector is the booming local construction industry, particularly that which is servicing developing sections of Port Moresby and Lae. In terms of markets, typically, for construction materials, most are sold on demand. In the case of precious minerals, such as gold, the value chain begins with the miners, and extends to a series of middlemen, to whom it is sold in small quantities. These middlemen, in turn, accumulate gold, and then sell it to buyers in cities. Some of these middlemen possess export licenses, which facilitate access to foreign markets. As activities are confined mostly to informal 'spaces', a large share of minerals produced is, inevitably, smuggled out of the country.

In addition to middlemen, companies such as Metal Refining Operation (MRO) purchase gold produced on a small scale. The MRO itself has a wide variety of customers, including a host of individual small miners and six large buyers who are based in major small-scale mining areas. Whilst operations in the sector range from individuals, through families and groups, to companies, the constant presence of buyers is a major key to the success of activities.

11.5.3 Mines and Quarry Management

In Papua New Guinea, small-scale mining is regulated by the Mineral Resources Authority, specifically by its Artisanal and Small-Scale Mining Support (ASMS) division. Several other institutions provide regulatory inputs, including Department of Mineral Policy and Geohazard Management (DMPGM), tasked with developing relevant minerals policy and law, and the Department of Environment and Conservation (DEC), responsible for environment management.

There is no one single law governing small-scale mining in Papua New Guinea. There are provisions for the sector in the two main pieces of legislation for mining, the *Mining Act 1992* and *Mining Safety Act*; the *Environmental Act 2000* is also important but it only addresses small-scale mining briefly. Essentially, the *Mining Act 1992* established the Alluvial Mining Lease (AML) and the Mining Lease (ML), both of which are relevant to small-scale mining. The former – which has a limit of five hectares – is restricted to traditional land owners, and is the most important (Mek 2011; Javia and Siop 2010). In an attempt to facilitate participation of 'legal' land owners in the sector, the *Mining Act 1992* sought to recognize more explicitly customary landowners, permitting them to conduct non-mechanized alluvial mining on their lands without a registered lease.

The ASMS section of the Authority has established support centres in various alluvial mining localities across the country, including Wau, Lae and in Wewak in East Sepik Province. Through these centres, the government provides technical advice, training and is able to continuously liaise on mining lease and tenement matters (Mek 2011). The key, however, to achieving more equitable and sustainable development of the sector is the government's continuous resourcing of its ASMS section. In fact, the section has long been understaffed and in some cases, its offices have closed down, most recently in Kanaitu and Maprik (Moretti 2007). Reduced levels of staff compromise the department's capacity to regulate activities as well as its general performance.

11.5.4 Environment, Health and Safety Concerns

As there are no specific regulatory frameworks in place for small-scale mining, environment impacts, safety related deaths and disputes over land occur with regularity. The largely illegal status of most operators has, indeed, been the source of these problems. Generally a lack of awareness of health and safety, as well as environmental problems associated with small-scale mining, and a lack of easily-accessible guidelines on how to minimize these risks have perpetuated poor operational practices in the sector. Again, many of the environmental issues associated with small-scale mining in PNG are associated with the gold sector as distinct from the mining of DM. Mercury is used by about 80-90 percent of the country's small-scale gold miners, as it has proved to be extremely effective with Papua New Guinean ores, and is relatively inexpensive (Crispin 2003; Moretti 2007; Begani 2013). About 4 t of mercury are released annually into the environment courtesy of small-scale mining (Mek

2011). Not surprisingly, most of Papua New Guinea's rivers are polluted with mercury.

The issue of illegal mining itself also relates directly to safety, as most miners are unfamiliar with 'best practices' and do not fully comprehend the risks associated with their activities. Javia and Siop (2010) very importantly link this to informality, explaining that 'Illegal mining activities, widespread unsafe use of mercury, gold smuggling, and severe environmental impacts are increasing rapidly because of the fact that small scale mining is not regulated in the country' (p. 2). Formalization of small-scale mining and increased awareness campaigns on health and safety could, therefore, help to address most of these problems

11.5.5 Entrepreneurship Skills

As has been the case in most countries, in Papua New Guinea, since country independence, emphasis has been placed on promoting large-scale mining. Small-scale mining has also been viewed by policymakers as more of an entrepreneurial activity rather than a source of livelihood. It was only recently that the government, through the Mineral Resources Authority, sought to clarify the role and importance of small-scale mining, as well as identify ways to promote it. Recognizing the role it plays in people's livelihoods, the government finally made the sector's development an important part of national development policy around the turn of the century (Crispin 2003). Due to the sector receiving little attention in policy, it was only recently (approximately 2004) that donors such as the World Bank, European Union, Japanese Social Development Fund (JSDF) and AusAid started funding projects through Mineral Resource Authority's ASMA division.

Most miners in Papua New Guinea are in desperate need of skills and support. They struggle to purchase equipment/machinery, have poor access to finance and credit schemes, lack management and administrative skills, and struggle to establish links with markets. The Small-Scale Mining Training Centres now in existence across the country are the ideal platforms for disseminating knowledge and support in these areas, though again the focus has not been on the commodities that make up the DM sector. If properly licensed, many miners could easily access necessary training from these centres. As these centres were built to service gold miners, programs will need to be modified if other types of miner are to be reached.

11.5.6 Geo-data and Maps design

For the longest time, Papua New Guinea showed little interest in publicizing mine-related data and making information available to prospective mine licensees. While there had been support given to the Geological Survey from various donors, including the EU and British Geological Survey, to produce geological data and maps, this data was traditionally not made available to small-scale miners. Unable to interpret maps, most laymen have tended to rely on guesswork to identify mineralized places. Updated geological data, maps of precious stone occurrences and general statistics on small-scale operators were generally not available.

There have been two very significant developments in recent years, however. The first concerns licensing and leasing. The government publishes information about licensing procedures on its website (<http://www.mra.gov.pg/License.aspx>) as well as maintains an up-to-date map of concessions on its Flexcadastre Portal (<http://portal.mra.gov.pg/Map/>), which can be accessed using any device with the internet. Second, despite comprising more than 600 islands, under an AUSAID funded project in the early-2000s, multiple mining locations were visited, largely to train people on environmental 'safe' practices, at which time, the number of people engaged in activities was estimated (Crispin, 2003a, 2003b). If numbers can be compiled in such an environment, there is no reason why censuses cannot be conducted elsewhere and built into geologically mapping exercises.

11.5.7. Community relations and addressing grievances

Papua New Guinea is an illustrative case of how superimposed legislation can 'create' conflict between parties. As explained, the *Mining Act 1992* empowered land owners by requiring leaseholders to pay compensation to customary land owners. However, at times, it is challenging to identify who, exactly, the landowner is, as many people consider themselves to be the rightful 'land owners'. There are also cases where leaseholders refuse to pay compensation because they have worked their plots for long periods of time and therefore, consider themselves to be the land owners, and refuse to pay anyone else (Moretti 2007). This needs to be revisited to ensure that there are no conflicts on land ownership issues and the rightful people are paid compensation.

In areas where large-scale mining activity takes place, illegal small scale gold mining activities often proliferate, which has led to land use disputes and violence that have not been experienced in the DM sector. The experiences in the large-scale mining sector serve as a reminder of how violent conflicts can become if fair and comprehensive policies are not in place beforehand. In addition to being the location of well-publicized conflicts at Bougainville and Ok Tedi (Hilson, 2002), there have been conflicts between Barrick Gold Corporation and local communities in Porgera, where illegal gold miners have encroached on to the concession and worked open pits. To ensure community benefits, and peaceful co-existence, some mining companies claim that they employ a group of specially-trained community relations officers who approach the 'intruders' and engage them in a non-threatening, non-violent way. During these interactions, they attempt to explain the dangers of illegal mining and the risks of accessing the pit with no appropriate safety measures in place and encourage them to leave the area peacefully. However, in some cases conflicts have escalated and companies have evicted the miners using force. Papua New Guinea illustrates the importance of having in place a comprehensive geological database, and using that database to identify suitable areas where people can be licensed.

11.6 Fiji

Although not without its challenges, Fiji has by far the most advanced regulatory and policy framework in place for DM in the Asia-Pacific. It has a lengthy history of mining, and has in place a fairly streamline regulatory apparatus and dynamic licensing system. It also makes available, through various government websites, data concerning concessions and legislation. These are quite remarkable achievements for an island nation that is fairly isolated.

11.6.1 Overview of Fiji's Mining Sector

In Fiji, mining and mineral exploration has long been dominated by gold production, specifically that from the Vatukoula mine, which commenced operation in 1933. Significant revenue, however, is also generated from extraction of industrial minerals, including sand, gravel quarried stone and coral sand. Fiji does also have notable reserves of copper, limestone and silver (Shi 2012), and hosts several undeveloped but nevertheless significant deposits of porphyry copper-gold and epithermal gold (Shi 2014)

Annually, the mining and quarrying sector accounts, on average, for 1.5 percent of GDP, generates on average 8.5 percent of total domestic exports and at its peak supported a workforce of over 1700 personnel as well as 350 contractors. There are several small, locally-operated industrial mineral quarries engaged in the extraction of such commodities as coral and river sand, limestone, stone and crushed gravel, and other construction aggregates. Sand mining is conducted by households for their own use and at times undertaken for profit by individuals, who sell to other users and commercial companies. The mining of sand from the island's beaches and from inland low-lying areas are important sources for the country's aggregates, and have been for a considerable length of time (Shi 2012, 2014).

11.6.2 Demand and Supply Issues

In 2011, Fiji produced at least 300,000 t of gravel and sand, and 50, 000 t of limestone (Shi 2012). At this time, Fiji had one British-owned gold and silver mining company, one locally-operated cement company, and several small locally-operated industrial mineral quarries that produced construction materials, such as limestone, sand and gravel, and other construction aggregates.

Demand for construction materials over the past three years has been fuelled by investment in tourism projects such as the Grand Pacific Hotel, Denarau Casino Development, Wyndham Vacation Resort, and the recommencement of the Momi Bay Development. This was supported by increased public sector spending on infrastructure development and the construction of a hydroelectric dam in Nadarivatu. The abovementioned Fijian cement producer, which is run by Fiji Industries Ltd., produces Portland cement and blended cement, and supplies the domestic construction market and for export to eight other Pacific island countries. In late 2010, Chinese company Tengy Cement Co. Ltd. was granted a 99-year industrial lease on 33 acres to build the second cement plant in Fiji.

Additional mineral exports from Fiji include lime, salt, and sulphur. (Shi 2013). There are economic limestone/marble deposits located at Qalimare (600Mt), Wailotua/Nakorowaiwai (1020Mt), and Devodra in Savusavu and Tau (7.0Mt). Fiji also has the potential to supply aggregate from quarried rocks, river gravel and sand both for export and domestic usage. Its salt is sourced from sea water (sodium chloride) and is produced in a number of areas, including Tavua and Rakiraki in Viti Levu, Nadroga in South West Viti Levu and Savusavu in South East Vanua Levu. There is a potential for local production to substitute for imports and also for export regionally.

11.6.3. Mines and Quarry Management

Fiji's mining industry is regulated by the *Mining Act & Regulations* (Laws of Fiji Chapter 146), although there are complementary statutes in place, such as the *Quarries Act* and the *Explosives Act*. These pieces of legislation are administered by the Mines Section and the Mines Inspectorate within the Mineral Resources Department of the government. The mining regulatory environment is one of the comprehensive found in the ACP category of countries. Highlights include the following (Shi, 2011):

- Laws of Fiji Chapter 146: *Mining Act & Regulations* – guides and regulates activities concerning the prospecting for, and mining of, precious metals and other minerals.
- Laws of Fiji Chapter 147: *Quarries Act & Regulations* – provides for the regulation of quarrying activities.
- Laws of Fiji Chapter 189: *Explosives Act & Regulations* – an act that regulates the manufacture, use, sale, storage, transport, importation and exportation of explosive substances
- Only Fiji out of the countries in the region has specific stand-alone legislation for aggregates.
- The Mineral Resources Department, Fiji's national geological survey and mining organization, develops mining policies, provides geologic information, assists mining investors, and facilitates the exploration and development of mineral and petroleum resources in the country, and is under the management of the country's Ministry of Lands and Mineral Resources.
- A draft Mineral (Exploration & Exploitation) Bill was developed in 2006 which, once gazetted, will replace the *Mining and Quarries Act*.

Significantly, for DM, the country has in place guidelines for artisanal, small and medium scale mining, which can be found in the Mining Act Cap 146, under the grant of a Permit to Mine. A Permit to Mine is granted for a period of two years and may be extended for a period of one year. It is a requirement for every prospective holder of a Permit to Mine to provide

a full report to the Director of Mines about the nature of the mineral deposit, as well as to submit a plan outlining the extent of the proposed operation and produce evidence to the satisfaction of the Director of Mines of the required working capital necessary to carry out the plan. An application for a quarryman's certificate may be made to an inspector for a fee of US\$10; the inspector then decides whether or not to award the certificate based on his/her satisfaction with the information supplied with the application. In the event that he/she is not, a follow-up oral examination may be required. A number of factors in relation to the applicant's suitability are also taken into consideration. Specifically, the individual must:

- (a) Have attained the age of 21 years;
- (b) Have had no less than two years' practical experience in quarrying;
- (c) Be fully conversant with the provisions of these Regulations and of all regulations made under the provisions of the Explosives Act relating to the handling, storage and use of explosives; (*Cap. 189.*)
- (d) Be proficient in rendering first aid to injured persons; and
- (e) Be otherwise a fit and proper person to hold such a certificate.

Fiji's exploration and mining administration system appears to be open and unbiased. Exploration and mining rights are awarded on the basis of merit, specifically to people – domestic or foreign – who can show the government that they have the ability to carry out an agreed upon work program. In cases where there are multiple applicants for a tenement, rights are allocated to the first qualified applicant. This system supports and protects the rights of all investors, both local and foreign, to prospect, explore and mine their mineral discoveries. Investors' rights to mineral tenements, and their security of title, are enshrined in Fiji's Mining Act and Regulations Cap. 146.

Holders of Prospecting Licenses have a right to progress from prospecting to mining if they have complied with the license conditions and they have proven that a minable resource exists. Mining Leases and Special Mining Leases can be issued for five to 21 years. All leases are renewable at the end of the initial license period. The period of the renewal depends on the size of the proven resource.

11.6.4 Environment, Health and Safety Concerns

As indicated, sand mining is conducted by households for their own use and for selling to other users and commercial companies. This has caused coastal erosion, exposed beach rocks along the coasts, and resulted in shoreline recession and inundation of low-lying areas. This has necessitated the identification of alternative sources of aggregate supply and at the same time provided an impetus for implementing policies aimed at facilitating the sustainable development of these resources.

The government sets environmental policies at two levels. On the one hand, the Department of the Environment coordinates the formulation and implementation of national policies. On the other hand, the Mineral Resource Department, as the main regulating agency for mining, sets complementary mineral sector policies.

11.6.5 Entrepreneurship Skills

The Government of Fiji recognizes the importance of having in place a sound regulatory environment to support the development of the mining industry. It is very close to finalizing a new Mineral Exploration and Exploitation Decree that will strengthen areas such as Environment and Social Impact Assessment, operational health and safety and stakeholder engagement. Over the past three years, new mining projects have emerged, including bauxite mining in Nawailevu in Vanua Levu and preparatory work on the Delta Iron Sand mine in Ba. There are additional projects in the pipeline.

Generally, entrepreneurship in Fiji has not been very vibrant, especially for local people. Obstacles include education, financial management, managerial experience and business skills, poor understanding of markets, inability to raise sufficient capital (due to poor or lack of access to credit facilities), short term planning perspective, and pressure from family and other traditional sources to distribute money instead of reinvesting in the business. This is one area which the government needs to shore up moving forward if it is to promote business ventures in the DM sector (see Hailey 1985; Rao 2004)

11.6.6. Community relations and addressing grievances

The government has done a commendable job in facilitating the direct participation of residents in mine-related decisions. It seems to view residents' involvement in such decisions as an integral step to building an effective long-term relationship between stakeholders. The rights of landowners and other stakeholders are enshrined in the *Mining Act & Regulations* (Cap 146). Provisions include a condition that, from early on in the exploration phase, the project sponsor and government, through the Ministry of Fijian Affairs, collaborate on a public information and education program about the anticipated nature and impact of the project.

The government is also of the view that the premature release of information may unduly raise residents' expectations. However, it does believe that consistent information flow needs to be established fairly early on in the project cycle to avoid misconceptions and unwarranted rumours about potential mine development. Once the project has come into operation, mine management is urged to consider establishing resident liaison committees to facilitate information exchange and to provide residents with a forum for airing their views. The Housing, Social & Regional Impacts Policies provides further clarification on landowners/ public consultation and participation in decision-making related to mining projects. All miners are required to carry out an environmental impact assessment, including a socio-economic study on the surrounding community (despite there being no specific environmental

legislation in place). Compensation will be paid to any persons and communities adversely affected during the course of operation, and concurrent reclamation will take place. Mines are required to contribute to a Mine Closure and Rehabilitation Fund.

The laws of Fiji, however, are very vague on the topic of mine closure. A project developer's obligations in terms of environment restoration, community rehabilitation, alternative livelihoods, care and maintenance are not clearly defined in the Mining Act & Regulation (Cap 146) and in the mining license/lease. There is no legislation which mandates the mine developer(s) to comply with mine closure provisions that are in line with international standards/best practices. To ensure that effective reclamation does take place, the government has pressured companies to establish trust funds, which can be used to finance rehabilitation work, promote alternative livelihoods and prepare communities for life post-reclamation.

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