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# State of the Artisanal and Small-Scale Mining Sector 2019

From **DELVE**

a global platform for  
**ARTISANAL & SMALL SCALE**  
mining data

Delve is an initiative to build a global platform for artisanal and small-scale mining (ASM) data. Its vision is a world in which ASM is recognized as an important contributor to global development.

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All opinions, views, and comments expressed in this report solely belong to the authors and do not necessarily reflect those of the World Bank, Pact, or any of the institutions the authors are affiliated with.

All data points and original open-access sources used in this report are on the Delve platform. To avoid further data recycling when referencing any figures contained in this report, the original source should be included; for example: McQuilken and Hilson, 2018, as cited in World Bank, 2019.

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# Abbreviations and Acronyms

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|                 |  |
|-----------------|--|
| ACP-EU          | African, Caribbean and Pacific Group of States, and European Union   |
| AMV             | Africa Mining Vision   |
| ARM             | Alliance for Responsible Mining  |
| ASGM            | artisanal and small-scale gold mining  |
| ASM             | artisanal and small-scale mining   |
| ASM18           | International Conference on Artisanal and Small-scale Mining & Quarrying   |
| CADETAF         | Central Purchasing and Development of the Tadialet and Figuig Mining Region<br>( <i>Centrale d'Achat et de Développement de la Région Minière du Tadialet et de Figuig</i> ) |
| CASM            | Communities and Small-Scale Mining initiative  |
| CIF             | cost, insurance, freight   |
| DMF             | District Mineral Foundation  |
| DRC             | Democratic Republic of the Congo   |
| EITI            | Extractive Industries Transparency Initiative  |
| GDP             | gross domestic product   |
| GGB             | Guyana Gold Board  |
| GGMC            | Guyana Geology and Mines Commission  |
| GIS             | geographic information system  |
| GNASSM          | Ghana National Association of Small-Scale Miners   |
| GNI             | gross national income  |
| GOLD            | Global Opportunities for Long-Term Development program   |
| GPS             | global positioning system  |
| GWMO            | Guyana Women Miners Org.   |
| HDI             | Human Development Index  |
| IBM             | Indian Bureau of Mines   |
| IGF             | Intergovernmental Forum on Mining, Minerals and Sustainable Development  |
| IIED            | International Institute for Environment and Development  |
| ILO             | International Labor Organization   |
| IPEC            | International Labor Organizations' Program on the Elimination of Child Labor   |
| km              | kilometers   |
| km <sup>2</sup> | square kilometers  |
| Laos            | Lao People's Democratic Republic   |
| LSM             | large-scale mining   |
| MAD             | Morocco dirhams  |
| MDG             | Millennium Development Goal  |
| MEMSD           | Morocco Ministry of Energy, Mines, and Sustainable Development   |
| MLNR            | Ghana Ministry of Lands and Natural Resources  |

|        |  |
|--------|--|
| MMSD   | Mining, Minerals and Sustainable Development Project     |
| MNFA   | Mongolia National Federation of Artisanal Miners         |
| MNT    | Mongolian tugriks  |
| MOEM   | Peru Ministry of Energy and Mining                       |
| MRPAM  | Minerals Resources and Petroleum Authority of Mongolia   |
| MSME   | micro, small, and medium enterprises                     |
| n.d.   | no date given  |
| NGO    | nongovernmental organization                             |
| NGT    | National Green Tribunal                                  |
| NMS    | National Mining Syndicate N                              |
| n.p.   | no page numbers given                                    |
| NSO    | National Statistics Office of Mongolia                   |
| NSSO   | National Sample Survey Organization                      |
| OECD   | Organisation for Economic Co-operation and Development   |
| PMMC   | Ghana Precious Minerals Marketing Corporation            |
| SDC    | Swiss Agency for Development and Cooperation             |
| SDG    | Sustainable Development Goal                             |
| TVE    | Township Village Enterprise                              |
| U.S.   | United States  |
| UNDESA | United Nations Department of Economic and Social Affairs |
| UNDP   | United Nations Development Programme                     |
| UNECA  | United Nations Economic Commission for Africa            |
| UNEP   | United Nations Environment Programme                     |
| UNIDO  | United Nations Industrial Development Organization       |
| USBM   | United States Bureau of Mines                            |
| USD    | United States dollars                                    |
| USGS   | United States Geological Survey                          |

# Glossary of Key Data Terms

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| Term  | Definition <sup>1</sup>   |
|---|---|
| Types of data                                       |   |
| Data  | Facts, opinions, and statistics that have been collected together and recorded for relevance or analysis.   |
| Primary data  | Data collected specifically for the research being undertaken.  |
| Qualitative data                                    | Nonnumerical data or data that have not been quantified.  |
| Quantitative data                                   | Numerical data or data that have been quantified.   |
| Raw data  | Data for which little, if any, data processing has taken place.   |
| Secondary data                                      | Data that were originally collected for a different purpose and that can be analyzed further to provide additional or different knowledge, interpretations, or conclusions. Multiple-source secondary data may be created by combining two or more sets prior to the data being accessed or used. |
| Evaluating data accuracy, validity, and reliability |   |
| Accessibility                                       | The extent to which the data are easily collected and the end user/viewer can easily understand the message or findings being conveyed.   |
| Accuracy  | The extent to which the data are correct and true in terms of measurement and represented in a consistent and unambiguous form.   |
| Comparability                                       | The extent to which different data sets drawn from different methods and analyses can be compared with one another or collectively used to support decision making.   |
| External validity                                   | The extent to which the research results from one study are generalizable to all relevant contexts.   |
| Evaluation  | The process of judging materials or methods in terms of internal accuracy and consistency or by comparing them with external criteria.  |
| Internal validity                                   | The credibility and trustworthiness of the data, which can be established through triangulation and checking with other data sources.   |
| Reliability   | The extent to which data collection techniques will yield consistent findings and similar observations or conclusions if repeated, or ensuring that there is transparency in how the data was collected, processed, and analyzed.   |

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<sup>1</sup>Adapted from Rudestam and Newton (2007); Saunders et al. (2012).



# About the 2019 Report and Delve

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The *2019 State of the Artisanal and Small-Scale Mining Sector* report showcases data contributions made to Delve and demonstrates the potential for a deeper sector analysis when stakeholders share data.<sup>2</sup> As the inaugural report of a planned annual series, the 2019 edition explores the origins and impact of what is identified as the ‘global data gap’ on artisanal and small-scale mining (ASM).<sup>3</sup> It outlines how through collaboration, the gap can be addressed to guide more effective ASM formalization efforts across the globe. Future reports will examine emerging themes of critical importance to ASM.

According to the latest figures found on Delve, ASM employs at least 40 million people worldwide.<sup>4</sup> Yet, unlike more familiar rural development sectors such as agriculture, data on the exact number of people engaged in ASM on a country-by-country level is sparse. Of the data that do exist, even less can be disaggregated by metrics such as gender, age, class, ethnicity, and educational background. When it comes to revenue, export, and trade, few, if any, national accounts distinguish between large-scale and ASM operations. There is also a need to contextualize this quantitative data with rich qualitative analyses and insights on the wider development, governance, and sociopolitical activities.

Such a global data gap has the cumulative effect of obscuring the true significance of ASM’s contribution to global development. This is despite, as this report shows, ASM being fundamental to achieving *all 17* Sustainable Development Goals (SDGs). Better access to complete, accurate, and reliable quantitative and qualitative data on ASM is needed to harness the sector’s enormous social and economic development potential.

To address the global data gap, in 2017 the World Bank and Pact launched a call to action to build a global online ASM data platform: Delve. The platform has three core components:

1. Powerful analytics and groundbreaking visualization through an open-source database that collates and shares existing ASM data from the literature and Delve collaborator contributions, enabling users to display data in a variety of graphs and charts, and to download raw data files
2. A searchable resource library that contains a full suite of standard and customizable ASM data questionnaires as well as relevant and reliable documents, and to which users can upload their work
3. A directory of ASM experts, partners, and Delve collaborators to promote networking and knowledge sharing across the space

The data in this inaugural report draws on primary and secondary sources. Opening with a compelling review that traces the origin of the global data gap on ASM, the report then examines the present-day challenges of effectively closing it. Next, the sector is placed squarely within the debate on the SDGs, demonstrating the ways in which ASM contributes directly to them. The third section provides an in-depth analysis of the data gaps and importance of ASM through regional and country-specific case study countries—Ghana, Mongolia, Guyana, Peru, Morocco, and India—drawing on the insights of Delve collaborators and the platform’s data sets. All country profiles can be accessed in Delve. Finally, the lessons learned from collating dispersed ASM data are presented, and a shortlist of key recommendations for improving data collection and data sharing is given. In recognition of the many shortcomings in data collection and analysis, every effort has been made to be explicit in defining terms and methodology, in addition to providing citation credits to the original source where possible. As more data are contributed to Delve, future iterations of the report will be able to build a fuller picture of the sector’s global value and contribution.

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<sup>2</sup>An earlier working draft of the report was shared for public consultation at The International Conference on Artisanal and Small-scale Mining & Quarrying (ASM18). Comments and suggestions received are included in this final version.

<sup>3</sup>In recognition of the diversity and wide-ranging degree of (in)formality of operations, there is no universal definition of ASM. Broadly, however, it comprises low-tech and labor-intensive mineral extraction and processing.

<sup>4</sup>Delve, 2019.



# Introduction

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## The need for better access to complete, accurate, and reliable data

The World Bank is one of the largest producers of development data and research. However, as boldly stated by the organization’s Senior Director of the Development Economics Practice Shantayan Devarajan, “. . . our responsibility does not stop with making these global public goods available; we need to make them understandable to a general audience.”<sup>5</sup> ASM is perhaps the only sector where practitioners and policy makers alike need better access to complete, accurate, and reliable data. Without this, the mission to make ASM understood to a general audience is simply too overwhelming to consider.

The justification for better access to complete, accurate, and reliable data is clear. Today ASM is one of the most indispensable—if not *the* most important—rural nonfarm activity in the developing world. But, while the sector’s environmental and social impacts have garnered considerable international attention, discussions about its economic importance, including making it a centerpiece of economic and poverty alleviation plans, rarely progress beyond dialogues that focus on its potential. The challenge today is not only changing the mindsets of sceptics who hold outdated views of the sector, it is also convincing those who are committed to formalizing the sector’s activities to act. But action requires a shared evidence base of the sector itself.

Apart from a series of outdated employment and production estimates in select countries, little is known about the organizational structures of ASM, the backgrounds of those engaged, and the production networks the mineral ores they extract supply.<sup>6</sup> Despite a growing body of in-depth academic studies and a multitude of development projects focused on ASM over the past two decades, ASM remains one of the most poorly studied industries in the developing world. Consider the World Bank: through its lending operations in Asia, sub-Saharan Africa, and Latin America, it has supported 35 mining sector reform projects of more than USD 1 million each, amounting to a combined figure exceeding USD 1 billion.<sup>7</sup> In each instance, part of the lending envelope went toward ASM formalization. Yet, since the closure of the World Bank’s flagship initiative on ASM, Communities in Small-Scale Mining (CASM), most of the data on ASM are dispersed.<sup>8</sup>

Indeed, today, the ASM sector faces a wide-ranging global data gap. This gap is defined by the near total absence of national and subnational baseline exercises that collect qualitative and/or quantitative data, and the corresponding lack of data shared collectively in the public domain. However, this global data gap is nothing new. As the following section outlines, awareness of the gap emerged in the mid-to-late 1980s and has only continued to widen since then, despite increasing attention and donor interest in the subject. Yet a very real consequence of the neglect paid to data collection and sharing has been the sector’s growing informality. Without granular qualitative and quantitative data on the sector, the chasm between what policy makers and practitioners understand, on the one hand, the sector *to be*, and on the other hand, what *it is*, will only continue to widen. There has never been a more optimistic time to reconsider the importance of publicly accessible, complete, accurate, and reliable ASM data. With a host of developments placing the sector now firmly back on the global development agenda, the impetus for formalization is at a pinnacle. Only by closing the global data gap on ASM will this call to action be realized.

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<sup>5</sup>World Bank, 2018a. *Atlas of Sustainable Goals 2018: World Development Indicators*, Washington, DC: World Bank.

<sup>6</sup>McQuilken and Hilson, 2018.

<sup>7</sup>McMahon, 2010.

<sup>8</sup>Until the end of 2012 the domain ‘[artisanalmining.org](http://artisanalmining.org)’ hosted the CASM website. In 2016 the domain became available and since this time has been maintained by Dr. Felix Hruschka as ‘The Artisanal and Small-scale Mining Knowledge Sharing Archive’ with the aim of collating lost CASM documents as well as acting as a repository and knowledge sharing platform for the ASM sector.

# A Persistent 40-Year Global Data Gap

## The genesis of data recycling

Data recycling—the process by which data is re-used without complete and explicit reference to the original source and context and full attention paid to its relevance and reliability—has had a damaging effect on the ability of ASM practitioners to clearly demonstrate the sector’s development potential (Box 1).

### BOX 1 Key concerns of data recycling

- Sends the inaccurate message that ASM populations remain static despite fluctuations in mineral prices and a country or region’s changing social and economic conditions
- Fails to trace the citation back to its original source, and thereby gives the false impression that figures are up to date
- Dissuades the commissioning of new baseline studies
- Leads to decision making and the mobilization of significant resources based on outdated, unsubstantiated, or incomplete data

Aside from a small group of experts’ keen on creating greater visibility for ASM, there were few, if any, efforts made in the 1970s and 1980s to gather field data that could have provided an accurate picture of the sector’s activities, operators, and main markets. Instead, most documents at the time drew on production data compiled in the 1950s, 1960s, and early 1970s. Problematic was the fact that the data from this early period refer to a very different scope and definition of ASM than is understood today, which is: a subset of conventional, large-scale mining (LSM) with all the same characteristics, technicalities, and challenges but simply on a smaller scale.<sup>9</sup> This is partly attributable to the positioning of ASM as an entrepreneurial venture and its problems as being technical in nature, needing solutions such as improved technology and business practices.

By the time the debate opened on ASM’s relationship to rural development and poverty alleviation in the mid-to-late 1980s and demands for policy interventions surfaced, it was too late. The global data gap pointed to the need for current data on the sector’s basic characteristics (e.g., laborers, production volumes, locations, international markets).

Recognizing the challenge posed by the now acutely apparent global data gap, in 1985, Carman first broached the subject highlighting the difficulties of tabulating global estimates of production for the sector:

Small-scale mining is a tough business and one which labors in obscurity. Writing about it is not easy: the basic problem is scarcity of documentation. Individual operations tend to warrant little attention in the international technical press. In many lands where meaningful production statistics are compiled, the contribution of small mines is hidden in national totals.<sup>10</sup>

<sup>9</sup>Hruschka, 2018 (personal communication): “Relating to early work (pp.5) such as Noetstaller 1987, it might be worth to note the prevailing ‘opportunity driven’ view of small-scale mining at that time, implicitly understanding it as conventional mining at smaller scale using intermediate technology. Under this aspect it is not surprising that sources such as the Minerals Yearbook (p.5: Carman 1985) or the Bureau of Mines data (p.11: Noetstaller 1987) were considered relevant. The term artisanal mining and a deeper understanding of the poverty driven nature of ASM became mainstream only years later. This implies and explains that data from this early period refer to a very different scope.”

<sup>10</sup>Carman, 1985, p. 119.

Undeterred, Carman proceeded to offer as comprehensive a picture as possible on ASM production, drawing mostly on data published in the United States Geological Survey (USGS)'s *Minerals Yearbook, 1982*.<sup>11</sup> From these, the author determined ASM's contribution to global non-fuel mineral production in 1982 to be 16%, concluding that "the data establish that small-scale mining makes a decidedly important monetary contribution to the mining industry."<sup>12</sup>

A few years on and with no access to new data, Noetstaller's 1987 *Small-Scale Mining: A Review of the Issues*, was unable to provide little more than a glimpse of what was already circulating in published documents, including Carman's 1985 work. Despite remaining one of the most heavily cited reports on ASM, it can be considered, in fact, largely a compilation of what were (most likely) already outdated statistics. A turning point away from data recycling and toward the collection of new ASM data should have occurred in the 1990s. A sea change seemed imminent, especially when considered against the backdrop of the papers presented at the 1991 *International Conference on Small-Scale Mining* in Calcutta. The presentation by the conference organizer, Prof. Ajoy Ghose, perhaps best captured the types of ideas that ASM experts would repeatedly broach over the decade:

Small-scale mining has earned the dubious distinction of being the springboard for people-centred development . . . [It] holds out opportunities to eradicate poverty, create employment, generate income from mineral exports, and provide social stability in the coming decades. A thriving small-scale mining sector, besides offering direct employment and "real" income to the unskilled rural populace, also helps in stemming the rural-urban migration, enabling people to stay rooted in their communities practising complementing agricultural and trades . . . In effect, the multiplier effects of small-scale mining are pervasive and significant, providing synergistic inputs into the local and regional economy. For example, small operations can form the basis for local processing and manufacturing industries, which, though "value added," may not be exported and may meet local and regional needs only, thus stimulating the economy.<sup>13</sup>

This momentum also carried over into the United Nations Department of Economic and Social Affairs (UNDESA)-hosted 1993 meeting on *Guidelines for Development of Small- and Medium-scale Mining* in Harare, Zimbabwe.<sup>14</sup> In addition to agreeing to abandon the pursuit of an all-encompassing technically-focused ASM definition, delegates conceded that the sector's benefits outweighed its costs and, thus, that it was amenable to upscaling, including formalization.<sup>15</sup> But while the tone of the dialogue had positively changed, it failed to ignite a scramble for *fresh* data. Instead, it triggered a wider search for *existing* recycled data, particularly numbers linked to employment, which began to feature in ASM analyses for the first time. While data were available, the initial investigations into ASM employment failed to scrutinize its reliability and the means by which they were obtained. For example, the employment figures quoted by Carman and Berger (1990) for a range of countries (Table 1) were more than a decade old at the time they were presented and were drawn from a series of conference papers coedited by one of the authors.<sup>16</sup> Similarly, the numbers provided by Noetstaller (1987) were all drawn from older sources, including Meyer and Carman (1980)<sup>17</sup> and various United States Bureau of Mines (USBM) Mineral Sector Yearbooks. In addition, the 200,000 figure cited for the Philippines is referenced by the author as being extracted from a newspaper article.

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<sup>11</sup>U.S. Bureau of Mines, 1982.

<sup>12</sup>Carman, 1985, p. 124.

<sup>13</sup>Ghose, 1994a, pp. 29-30, 37.

<sup>14</sup>The World Bank roundtable discussion mainly built off of the 1993 Harare meeting; see Labonne, 1994.

<sup>15</sup>Ibid.

<sup>16</sup>Meyer and Carman, 1980.

<sup>17</sup>Cited by the Noetstaller as "UNITAR, 1980."

**TABLE 1** Early estimates of the number of people engaged in ASM as presented at the UNDESA conference

| Country   | Estimated number                                |
|---|---|
| Presented in Carman and Berger (1990); original sources include Meyer and Carman (1980) and Carman (1985) |   |
| Central African Republic  | 15,000–20,000                                   |
| Rwanda  | 30,000–40,000                                   |
| Sierra Leone  | Up to 40,000 engaged in alluvial diamond mining |
| Venezuela   | 15,000  |
| Presented in Noetstaller (1987); original sources include Meyer and Carman (1980)                         |   |
| Chile   | 11,000  |
| Mexico  | 25,000–30,000                                   |
| Morocco   | 39,400  |
| Peru  | 40,000  |
| Philippines   | 200,000   |
| Rwanda  | 20,000–50,000                                   |

The World Bank held an *International Roundtable on Artisanal Mining* in May 1995, with hopes of building on discussions at the previous conferences and shifting the focus away from technical interventions and the vision of miners as being purely entrepreneurs.<sup>18</sup> Delegates (including donors, government representatives from across the developing world, and consultants) discussed at length the sector's overlooked socioeconomic importance and deep-rooted links to poverty. The roundtable succeeded in peaking donor interest in the social aspects of ASM, as evidenced by a new wave of project work that built on ASM's livelihood elements.<sup>19</sup> This reoriented position should have triggered a frenzied collection of detailed demographic data on ASM populations to fill the gap in livelihood information that was now very clearly apparent. The discussions building up to and during the World Bank roundtable certainly suggested a growing awareness of the sector's livelihoods dimension. This was in line with a wider shift in thinking on international development theory and practice, which saw poverty being redefined in terms of social issues and multiple dimensions instead of purely economic terms.<sup>20</sup> However, instead of capturing new data, the trend in data recycling and the global data gap remained throughout the mid-1990s and into the 2000s.

This is evidenced by the United Nation's 1996 publication *Recent Developments in Small-Scale Mining: A Report of the Secretary General of the United Nations*. The report draws on a series of outdated employment data that were quoted by researchers in various presentations from the 1990s, such as for Brazil 1 million,<sup>21</sup> China 3 million,<sup>22</sup> and India 500,000 people in the ASM industry.<sup>23</sup> For several African countries, these numbers were supplemented with more antiquated statistics from the 1992 World Bank publication *A Strategy for African Mining*.<sup>24</sup> Several years later, the International Labour Organization's 1999 report *Social and Labour Issues in Small-Scale Mining* aimed to address the data gap by sharing more representative numerical assessments of ASM populations worldwide. It contains the most widely

<sup>18</sup>Barry, 1996.

<sup>19</sup>The list of projects included work sponsored by the U.K. Department for International Development and UNDESA, specifically a series of livelihoods studies in ASM communities across sub-Saharan Africa, including Ghana, Tanzania, Cameroon, and Zambia (UNDESA, 2003; U.K. Department for International Development, 2004) and AusAID-funded work on mercury pollution at small-scale gold mines and the development of micro-credit support facilities for operation in Papua New Guinea.

<sup>20</sup>See Willis, 2011.

<sup>21</sup>Davidson, 1990.

<sup>22</sup>Jennings, 1995.

<sup>23</sup>Chakravorty, 1994.

<sup>24</sup>World Bank, 1992.

cited estimate of the global ASM workforce used today: 11.5-13 million people directly engaged and an additional 80-100 million indirectly dependent on the sector for their livelihoods. However, these figures are based on compilations of data retrieved via 81 questionnaires (of which 43 were replied to) distributed to government agencies, chambers of mines, and trade unions across Africa, Asia, and Latin America, as opposed to a comprehensive baseline survey. To their credit, officials at the ILO acknowledged in the report the potential limitations of the data collection exercise, noting “*the unscientific nature of the questionnaire*”<sup>25</sup> and qualifying their efforts by stating that: “*Extrapolations of limited data can be risky but, taking into account the fact that most of the major small-scale mining countries are included in the table, it can be assumed that 11.5-13 million people worldwide are engaged in small-scale mining.*”<sup>26</sup>

Indeed, despite what is perhaps the only case where a concerted and wide-ranging effort to capture accurate and detailed qualitative and quantitative data on the global ASM sector has been undertaken through the Minerals, Mining and Sustainable Development (MMSD) project in the early 2000s (Box 2), data recycling and the global data gap remains to this day. The most recent efforts made to characterize the sector as part of a background paper for the Intergovernmental Forum on Mining, Minerals and Sustainable Development’s (IGF) 2017 annual meeting highlight the challenge facing practitioners. With no new data to analyze, the authors were forced to rely on secondary literature:

This research paper reviews the existing literature on key thematic areas, bringing various findings together and providing updated information. . . . Factual numbers for key aspects of the ASM sector are still limited, but this paper demonstrates some of the knowledge gaps in the sector and pulls together important data on selected thematic areas.<sup>27</sup>

In the absence of comprehensive baseline studies, most employment figures in the report are attributed to The Artisanal and Small-scale Mining Knowledge Sharing Archive.<sup>28</sup> However, this website, while being an important knowledge repository established in 2016 to archive the ASM resources once held on the CASM webpage, aggregates employment data from published reports, largely ILO (1999) and the two global reports produced under MMSD (Box 2).<sup>29</sup> Without clear signposting, this recycling of data, though unavoidable without fresh baseline studies, gives the illusion that the authors carried out primary data collection in order to provide an “update on key ASM numbers.”<sup>30</sup> Battling these limitations, the authors call for a “*need to improve national data benchmarking and consistency, to disaggregate numbers by gender, and to establish a criteria-based census of ASM operators*” and advocate that global databases such as Delve can play a key role in providing a platform to collate and share data as well as promote awareness raising and collaboration.

The most recent data collection effort came with the launch of the African, Caribbean and Pacific Group of States, and European Union (ACP-EU) Development Minerals Programme in 2015, which is implemented in partnership with the United Nations Development Programme (UNDP). Development minerals have largely been neglected in the ASM debate. The program includes multiple in-depth baseline surveys to both quantify and qualify the development minerals sector<sup>31</sup> and in doing so has brought a suite of additional, overlooked data on development minerals<sup>32</sup> into formalization discussions.

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<sup>25</sup>ILO, 1999, p. 80.

<sup>26</sup>Ibid., n.p.

<sup>27</sup>IGF, 2017, p. 1.

<sup>28</sup>ASM Knowledge Sharing Archive, 2018.

<sup>29</sup>ILO, 1999; Hentschel et al., 2002.

<sup>30</sup>IGF, 2017, p. 1.

<sup>31</sup>Hilson, 2016; Franks et al., 2016; Franks 2017; Lewis and Franks, 2017; Hinton et al., 2018.

<sup>32</sup>Development minerals “are minerals and materials that are mined, processed, manufactured, and used domestically in industries such as construction, manufacturing, and agriculture” (Franks et al., 2016). This group of commodities, including minerals, construction materials, dimension stones, and semiprecious stones have previously also been referred to as “low value minerals and materials,” though this term does not give due credit to their significance.

## **BOX 2 Best Practice Data Collection and Sharing: Minerals Mining and Sustainable Development (2000–2002)**

Emerging in the early 2000s, this project explored a series of subjects that industry leaders identified as priority issues and marked a watershed moment for ASM data collection, with experts commissioned to produce 12 country reports for Bolivia, Burkina Faso, China, Ecuador, Ghana, India, Indonesia, Mali, Papua New Guinea, Peru, Philippines, and Southern Africa. These reports yielded a level of detail not seen in nearly two decades of ASM coverage. Notable developments included:

- The revision of Mali's ASM population from 100,000 to 200,000
- How in Peru, 70% of the gold produced by artisanal or informal means took place in the Madre de Dios region bordering Brazil, Bolivia, and the Andes
- Updated wage and demographic data for ASM populations in the Talawaan, Tatelu, and Ratatotok areas, three gold mining sites in Northern Sulawesi, Indonesia
- Updated figures on Burkina Faso, including the size of its ASM workforce, which increased to 100,000–200,000 from 50,000–100,000, and an updated number of sites estimated to be 200

The project also published the *Global Report on Artisanal & Small-Scale Mining*, a critical think piece about the sector that built on ideas broached in the ILO (1999) report. Backed and largely legitimized by evidence contained in the 12 country reports, the global report made bold claims, such as how “[assistance] Projects should be based on an integrated approach that considers organizational, social, economic, legal, technical and environmental issues together,” or that “Small-scale mining in these areas has a domino effect on the local economy, as most of the revenues are reinvested in the region,” and that “The implementation of technical ‘solutions’ always require detailed knowledge of the cultural, social, economic and organizational context of the miners.”

The project also showcased some of the very important bilateral work taking place at the time that today is still in need of expansion and replication elsewhere. This included ore treatment work (gold recovery plants installed) under the auspices of the Swedish Geological Survey in Ecuador in the late 1990s and the AusAID-funded pilot educational project in Papua New Guinea (1998–2001), which implemented microfinance and educational schemes. As a result, MMSD became a focal point for knowledge exchange and data pooling, including dissemination of information on best practices in the sector. This research further culminated in the launch of the Communities and Small-Scale Mining (CASM) initiative (2001–2010) hosted by the World Bank, which served as a mouthpiece and information sharing platform for the sector. Until the end of 2012, the CASM website held a wealth of ASM-related resources, acting as a centralized repository.

As part of this program, in September 2018, ACP-EU hosted over 500 delegates, including more than 150 miners, in Livingstone, Zambia, to debate the most pressing issues and opportunities facing the sector. This International Conference on Artisanal and Small-scale Mining & Quarrying (ASM18) was a pinnacle in global ASM dialogue on a scale never seen before. The result was the *Mosi-oa-Tunya Declaration on Artisanal and Small-scale Mining, Quarrying and Development*.<sup>33</sup> Covering a range of topics in urgent need of redress, such as gender mainstreaming, updated legal and policy frameworks, and inclusive finance, the declaration also provided clear wording on data (Box 3).<sup>34</sup>

<sup>33</sup>Named after the Tonga words for the Victoria Falls “The Smoke that Thunders,” where the conference was held.

<sup>34</sup>ASM18, 2018, p. IX.



### BOX 3 Mosi-oo-Tunya Declaration excerpt on data

#### Data Management

*Acknowledge* that accurate and transparent data collection and analysis on ASM contributes improved knowledge, accountability and more effective support to miners.

*Urge* governments, research and training institutions, the private sector, and civil society to collaborate on data collection and data sharing, including contributing to open databases, integrate ASM into general census and surveys, and use data for improved policy making and transparency.

*Note* the value of data collected from ASM and call on all stakeholders to ensure that the benefits of data are fairly shared.

## Addressing the persistent (and growing) global data gap

The size and awareness of the ASM global data gap has never been bigger. This is because the spotlight on the sector is now greater than it has ever been, which in turn has been driven by several key developments:

- A fourfold increase in the price of gold since the turn of the century, as well as an increase in demand for metals such as tantalum used in electronics and cobalt for rechargeable lithium-ion batteries found in smartphones and electric cars, which has fueled the movement of millions of people into the sector
- Opening up of new mining frontiers to foreign investment, such as Mali, Mauritania, Mongolia, Myanmar, and Viet Nam, which has put large-scale international mining companies into contact with artisanal and small-scale parties
- Recent commitment by the Extractive Industries Transparency Initiative (EITI)<sup>35</sup> to include ASM in its reporting
- Surfacing of regional and international agreements, such as the Africa Mining Vision<sup>36</sup> and the Minamata Convention on Mercury,<sup>37</sup> that require signatories to think more dynamically about ASM's livelihoods dimension
- Introduction of conflict mineral and due diligence legislation, such as the 2010 Dodd-Frank Act, Section 1502, which required U.S. manufacturing companies to disclose a chain of custody for minerals originating from the African Great Lakes Region,<sup>38</sup> and the European Union's 2017 conflict minerals regulations<sup>39</sup>
- Design and implementation of various codes of practice and related due diligence, traceability, and certification schemes for ensuring conflict-free, ethical, and responsible ASM supply chains<sup>40</sup>

While the absence of the Internet, centralized electronic databases, and computer facilities undoubtedly constrained well-intentioned data-gathering exercises in the early decades, today modern technology offers great potential to undertake extensive baseline surveys to better quantify and qualify the sector and help close the global data gap. Also today, handheld smartphones, tablets, GPS devices, and increasingly

<sup>35</sup>EITI, 2018.

<sup>36</sup>AU, 2009.

<sup>37</sup>UNEP, 2017

<sup>38</sup>Security and Exchange Commission, 2012.

<sup>39</sup>European Union, 2017.

<sup>40</sup>Examples include: Organisation for Economic Co-operation and Development (OECD)'s *Due Diligence Guidance for Responsible Supply Chains of Minerals and Metals from Conflict-Affected and High-Risk Areas* (OECD, 2013); Fairtrade International's and Alliance for Responsible Mining's now separate ASGM and associated precious metals certification schemes (ARM, 2013; Fairtrade International, 2013); and the Kimberley Process Certification Scheme for diamonds (Kimberley Process Certification Scheme, 2018).

portable analytical equipment have made data collection methods faster, more efficient, and easier than ever before. Though research in many remote rural communities remains challenging, road infrastructure and general development has improved, meaning that many ASM communities increasingly host such activities. Another opportunity exists through collaboration with the various organizations that have been implementing due diligence, traceability, and certification initiatives for close to a decade now. Their experience in developing new data collection methods and techniques, as well as the rich data sets they have been generating, could be invaluable to help narrow the data gap.

Since MMSD concluded in 2002, a flood of academic work has been undertaken, further underscoring ASM's economic importance and rootedness in countless rural economies across the developing world. These findings, along with the growing number of donor, government, and NGO-implemented projects with ASM communities across many regions, have fortified the case for formalizing and supporting the sector on social and, crucially, economic grounds. The urgency now is to catalyze on this momentum by ensuring that public data sharing can take place on a truly global scale and that all ASM stakeholders are operating, literally, from the same baseline.

# The Contribution of ASM to the Sustainable Development Goals (SDGs)

In 2015, the UNDP published *Mapping Mining to the Sustainable Development Goals: An Atlas* as a blueprint for clarifying how mining in general contributes to the SDGs. On the one hand, the report acknowledges that “Tens of millions of people worldwide depend on ASM for their livelihoods and incomes, far more than depend on large-scale mining (LSM).”<sup>41</sup> Yet, on the other hand, the report opts to “focus on large-scale mining” and only discusses ASM “when it directly relates to LSM.” This is a crucial oversight because it paints an inaccurate picture of the role ASM can play developmentally in the world’s resource-rich but poor countries and, in the process, how its growth can help address the SDGs. However, the Atlas is correct in stating that “The scale of ASM warrants a separate guide and review to map the opportunities on how ASM can contribute to the SDGs.”

So how exactly do the SDGs relate to ASM? The development challenges associated with the ASM sector cut across all 17 SDGs (Table 2). However, as has been made clear, a lack of access to complete, accurate, and reliable data makes building a case for designing and implementing effective ASM formalization and support projects a challenge, let alone accurately charting the progress of such initiatives and thereby the contribution of ASM to the attainment of the wider SDGs.

**TABLE 2** Examples of how ASM applies to select SDGs<sup>42</sup>

| Sustainable Development Goal  | Relationship to ASM   |
|---|---|
| Goal 1: No Poverty<br><i>End poverty in all its forms everywhere</i>  | ASM is a largely poverty-driven activity that provides a vital economic lifeline to millions of people in rural communities. It is also a source of wealth creation and, if properly harnessed, can be a driver for social and economic development both locally and nationally by generating tax and export revenues, and through value addition activities.   |
| Goal 2: Zero Hunger<br><i>End hunger, achieve food security and improved nutrition and promote sustainable agriculture</i>  | Inextricable links and feedback mechanisms exist between mining and farming livelihoods. <sup>43</sup> In rural communities, ASM supports agriculture by creating the capital needed to purchase equipment and fertilizers and is an additional market for local foodstuffs. ASM also extracts a significant number of development minerals used as fertilizers and in feeds. Yet, poorly managed mining destroys agricultural land and water bodies.   |
| Goal 5: Gender Equality<br><i>Achieve gender equality and empower all women and girls</i>   | Women are very active in ASM; <sup>44</sup> on average they account for 30–50% of the workforce and in some cases more than 90%. However, despite being economically empowered through ASM, their participation is usually confined to lower paid roles, and they often face extreme discrimination both in law and due to social norms around land ownership, obtaining bank loans, becoming license holders, and mining in certain roles. Women can also face gender-based violence and are negatively impacted by the lack of sanitation and child care facilities in and around mine sites. |
| Goal 6: Clean Water and Sanitation<br><i>Ensure availability and sustainable management of water and sanitation for all</i><br>Goal 14: Life Below Water<br><i>Conserve and sustainably use the oceans, seas and marine resources for sustainable development</i> | ASM activities are inherently linked to water; water is integral to the processing activities, and many mineral deposits, such as placer gold and sand dredging, are found in fluvial environments. When poorly managed, ASM can cause siltation, pollute through mercury and cyanide releases, and destroy sources of potable water for drinking, household activities, and agriculture. <sup>45</sup>   |

(continues)

<sup>41</sup>UNDP, 2015, n.p.

<sup>42</sup>United Nations, 2018. Note this table is a snapshot (and not an exhaustive list of all 17) of how the SDGs relate to ASM.

<sup>43</sup>Maconachie and Binns, 2007.

<sup>44</sup>Hilson et al., 2018.

<sup>45</sup>Clifford, 2015.

**TABLE 2 Continued**

| Sustainable Development Goal  | Relationship to ASM   |
|---|---|
| Goal 8: Decent Work and Economic Growth<br><i>Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all</i>  | ASM provides multiple income streams for a diverse range of skilled and unskilled labor, including through the multiplier effect of job creation in associated industries. ASM also acts as an economic refuge, safety net, and springboard for further wealth creation by providing ready access to capital.   |
| Goal 15: Life on Land<br><i>Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss</i>                | ASM activities, especially informal mining, can have significant impacts on terrestrial ecosystems, while mine rehabilitation and more environmentally friendly working practices offer the opportunity to restore and improve natural ecosystems.  |
| Goal 16: Peace, Justice and Strong Institutions<br><i>Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels</i> | Equitable mineral resource governance requires effective, accountable, and inclusive institutions to ensure that local communities and society benefit from the wealth activities create. Furthermore, issues such as forced labor, human rights abuses, conflict minerals and “blood diamonds,” and conflicts over land and mineral rights between various stakeholders all fall under this SDG. |
| Goal 17: Partnerships for the Goals<br><i>Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development</i>  | Due to ASM’s crosscutting nature, the sector’s negative impacts can be mitigated and socioeconomic development potential harnessed only through partnerships at the local, national, and international levels.  |

The journey taken to implement programs and activities regionally under the auspices of the SDGs will undoubtedly yield greater insight on the role the ASM sector plays economically. It will also help to position policy makers and donors to gather the data needed to implement more robust policies and laws for the sector. Unlike with ASM’s glaring omission from their precursor the Millennium Development Goals (MDGs), there is at least a sense that the SDGs will make better progress on ASM given the growing awareness of the sector’s livelihoods dimension and the need for data that shed greater light on its dynamics. Indeed, the SDGs simply touch on too many subjects relevant to ASM—poverty reduction, job creation, sustainable economic growth, child labor, gender, environmental protection, clean water, responsible sourcing, and production—for the sector to be ignored in discussions.

The malleability of the SDG framework can also support ASM formalization efforts. Unlike the MDGs, there is scope for fine-tuning under the SDGs because the latter are very macro and high level in their orientation and, of particular relevance to ASM, offer little guidance on how to address the informal sector. As a guide for grafting the local onto the national, the UNDP and partners published *Roadmap for Localizing the SDGs: Implementation and Monitoring at Subnational Level*.<sup>46</sup> The document not only provides ideas on how to build a sector such as ASM into existing policies and programs and for designing interventions which speak to the SDGs, but more importantly, the roadmap legitimizes the effort to do so.

The remainder of this report examines key methodological challenges underpinning the global data gap and sheds further light on the state of ASM sector data availability through a series of regional and country profiles. Certain regions and countries have received more coverage than others and, therefore, have more data to work with when it comes to designing and implementing ASM policies and programs that speak to the SDGs. But overall, every country has a persistent data gap, some more sizable and of varying data needs than others, which only greater conviction and action by governments, donors, consultants, and mining companies can fill.

Moving forward, one of Delve’s key aims is to demonstrate how support for and formalization of ASM activities can help fulfill the SDGs. By providing an accessible online platform for data collection and knowledge sharing, and encouraging collaboration and contributions, Delve aims to provide the framework and impetus necessary for monitoring progress and to help ensure that the sector is recognized for its contributions to the SDGs.

<sup>46</sup>UNDP et al., 2016.

# Regional and Country Profiles

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The following regional and country profiles provide an overview of the past and current trends in select regions of the world where ASM is dominant, thereby providing an update on the state of the sector and its data. Structured in accordance with the World Bank's geographical divisions,<sup>47</sup> the profiles summarize trends in ASM and highlight the need for better access to complete, accurate, and reliable data. Each country profile concludes with a list of key data needs, providing a call to action and for collaboration.

The data in the Delve database and this report are not definitive. The global data gap means that in many cases there is only limited data available or a variety of contrasting estimates. Therefore, inclusion of a statistic does not constitute an endorsement of its reliability, but instead enables a detailed analysis and illustration of the significant data challenges and gaps.

## Rationale for regional and country profile selection

The rationale for selecting the regional and country profiles was to ensure global coverage while also showcasing a mix of geographies and sharing data not regularly covered in the ASM literature. The country profiles feature a varied spread of case studies and show the diversity of ASM and wide-ranging data gaps.

- **Morocco** and **India** traditionally have not been a focus in the ASM literature or of data collection more generally but are in much need of greater attention and support
- **Ghana** has rapidly changing ASM dynamics and thus needs in-depth analysis and data
- **Guyana** and **Peru** both have large ASM populations and show the sector's diversity of activities, history, and trajectories within the same region
- **Mongolia** has been the focus of a significant amount of work in recent years that has narrowed the data gap, thereby presenting a case where significant lessons can be learned about collecting and sharing ASM data

Europe and Central Asia are omitted from the 2019 report due to the lack of verifiable ASM population data.<sup>48</sup> Future editions will include these regions as more data become available, such as ongoing research on amber mining in Eastern Europe under the Forest Smart Mining initiative.<sup>49</sup>

## Regional comparison

What can be said about the state of the sector across different regions? As a composite indicator, the Human Development Index (HDI) measures average achievement in three basic dimensions of human development: a long and healthy life, knowledge, and a decent standard of living. The HDI has cutoff values for very high (0.894), high (0.757), medium (0.645), and low (0.504) human development categories, and some of the indicators are also used to track progress against the SDGs.

Table 3 presents the 2017 HDI values for each global region.<sup>50</sup> The data show that both sub-Saharan Africa and South Asia have the lowest HDI and the highest ASM populations. Strikingly, sub-Saharan Africa has the lowest indicators in life expectancy and education and the highest number of miners as a percentage of the total labor force (population aged 15 years and above). Therefore, these data help demonstrate the

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<sup>47</sup>The regional divisions as defined by the World Bank are sub-Saharan Africa, East Asia and Pacific, Europe and Central Asia, Latin America and Caribbean, Middle East and North Africa, and South Asia. See World Bank, 2017a for a breakdown of the countries in each region.

<sup>48</sup>For example, Russia anecdotally has a large number of people gold panning, and the Kyrgyz Republic is estimated to have 5,000-10,000 small-scale gold miners working at an older abandoned large-scale site. See Université du Québec à Montréal, n.d. and Mestre, 2017.

<sup>49</sup>World Bank, 2019.

<sup>50</sup>UNDP, 2018b.

correlation between poverty and ASM and add weight to the now widely accepted argument that ASM is largely a poverty-driven activity.<sup>51</sup>

However, on their own, the data cannot be used to infer statistical relationships and the picture is far more complex than presented. A range of factors, such as the composition of each region (i.e., developed vs. developing economies) may skew how the data are presented. For example, Latin America and Caribbean includes economies such as Brazil and Costa Rica, which are considered to have “high human development,” with countries such as Haiti, which is considered to have “low human development” and is ranked near the bottom of the HDI. Therefore, data transparency as well as contextual qualitative information is crucial to show how values and calculations were arrived at.

**TABLE 3** Regional human development indicators and number of people engaged in ASM

| Region <sup>52</sup>                                     | Human Development Index (HDI) <sup>53</sup> 2017 | SDG 3 Life expectancy at birth (years) 2017 | SDG 4.3 Expected years of schooling 2017 | SDG 4.6 Mean years of schooling 2017 | SDG 8.5 Gross national income (GNI) per capita 2017 | Delve estimated number of people directly engaged in ASM <sup>54</sup> (various years) | Labor force population total <sup>55</sup> and percentage engaged in ASM <sup>56</sup> 2017 |
|--|--|---|--|--------------------------------------|---|--|---|
| Europe and Central Asia                                  | 0.771<br>High                                    | 73.4  | 14.1                                     | 10.3                                 | 15,331  | 100,000  | 438,656,366<br>0.023%   |
| Latin America and the Caribbean                          | 0.758<br>High                                    | 75.7  | 14.4                                     | 8.5                                  | 13,671  | 2,258,625  | 309,794,414<br>0.729%   |
| East Asia and Pacific                                    | 0.733<br>Medium                                  | 74.7  | 13.3                                     | 7.9                                  | 13,688  | 9,800,500  | 1,261,000,000<br>0.777%   |
| Arab States (Middle East and North Africa) <sup>57</sup> | 0.699<br>Medium                                  | 71.5  | 11.9                                     | 7.0                                  | 15,837  | 1,874,000  | 150,133,060<br>1.248%   |
| South Asia   | 0.638<br>Low                                     | 69.3  | 11.9                                     | 6.4                                  | 6,473   | 16,290,000   | 694,125,545<br>2.347%   |
| Sub-Saharan Africa                                       | 0.537<br>Low                                     | 60.7  | 10.1                                     | 5.6                                  | 3,399   | 9,856,000  | 415,303,937<br>2.373%   |

<sup>51</sup>Hilson and McQuilken, 2014.

<sup>52</sup>Regional divisions as per UNDP, 2018b, p.106, which almost match the World Bank divisions used in this report and by Delve.

<sup>53</sup>UNDP, 2018b.

<sup>54</sup>The regional ASM population estimates are from the aggregate data on the Delve database at the time of writing. Given the data challenges discussed in this report, the figures are not definitive.

<sup>55</sup>Labor force comprises people ages 15 years and older who supply labor for the production of goods and services during a specified period. It includes people who are currently employed, people who are unemployed but seeking work, and first-time job-seekers. However, not everyone who works is included. Unpaid workers, family workers, and students are often omitted, and some countries do not count members of the armed forces. Labor force size tends to vary during the year as seasonal workers enter and leave.

<sup>56</sup>The “percentage engaged in ASM” is calculated by using the ASM population, and the labor force statistics = (A/B)\*100.

<sup>57</sup>This regional division is similar to the World Bank Middle East and North Africa division, except that the UNDP category includes Somalia (15,000 miners) and Sudan (1,150,000 miners).



## Regional profile: Sub-Saharan Africa

By region, sub-Saharan Africa is home to one of the largest numbers of artisanal and small-scale miners in the world, close to an estimated 10 million (Table 3),<sup>58</sup> with at least a further 60 million people who derive a livelihood or are supported by its activities in associated industries.<sup>59</sup> Perhaps as much as 2.3% of the continent's labor force is engaged directly in ASM (Table 3). Its growth has been most significant over the last two decades. In 1999, approximately 2 million people were said to be mining in 24 countries across the African continent.<sup>60</sup> Today, five times that number of people can be found directly engaged in ASM activities in at least 40 of the 54 countries.

The sector's importance for poverty alleviation, employment, livelihoods, and wealth creation in the region cannot be overstated. Here, operations are typified by their informality and rudimentary nature and praised for their importance as largely poverty alleviation activities.<sup>61</sup> When compared to the general dearth of information on ASM, qualitative data in the region are particularly rich.<sup>62</sup> Yet, there remain glaring data deficiencies regarding the true number of people involved in ASM in the region due to the lack of comprehensive baseline surveys that have been conducted and a general omission of ASM in general household surveys and other national data collection exercises. Considerable qualitative and quantitative data gaps remain in many countries.<sup>63</sup>

Overall, there is very little accurate, reliable, and comparable data that have been aggregated to portray a comprehensive picture of ASM activities and production networks<sup>64</sup> in these geographies. Meanwhile, detailed quantitative data have been generated and collected only recently, thanks to the emergence of initiatives largely designed to address issues of sourcing conflict-free minerals. Organizations like Solidaridad, Fairtrade International, and Alliance for Responsible Mining (ARM) have been working with ASM communities in Burkina Faso, Ghana, Kenya, and Tanzania in recent years to extend their gold certification schemes in the region.<sup>65</sup> While the International Tin Association,<sup>66</sup> with the support of the NGO Pact, has been implementing the ITSCI Programme for the responsible sourcing of tin from mines in Burundi, DRC, Rwanda, and Uganda to market for nearly a decade.<sup>67</sup> However, the extent to which the data being collected as part of these schemes and wider donor-funded research, development programs, and individual projects is publicly and/or easily accessible and available varies.

A notable region-wide policy initiative that could act as a vehicle and impetus for data collection and sharing is the Africa Mining Vision (AMV). Established in 2009 as the blueprint for mineral-led development in the region over the next 50 years, the AMV was formed by the African Union in partnership with numerous international agencies.<sup>68</sup> It calls upon signatories to commit to “*foster[ing] the establishment of resilient artisanal and small-scale mining (ASM) communities*”<sup>69</sup> through formalization, and in order to do so underscores the need to “*improve the understanding of ASM issues. . .*” through data collection.<sup>70</sup>

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<sup>58</sup>This figure is drawn from the Delve database at the time of writing. It is not definitive.

<sup>59</sup>This figure is calculated by rounding up the 9,856,000 to 10,000,000 and multiplying by 6 (the multiplier as suggested anecdotally by Hilson and McQuilken 2014).

<sup>60</sup>ILO, 1999.

<sup>61</sup>See Hilson and McQuilken, 2014 for a review.

<sup>62</sup>ASM in countries such as Burkina Faso, Democratic Republic of the Congo (DRC), Ghana, Madagascar, Sierra Leone, and Tanzania is relatively well documented.

<sup>63</sup>These include Cameroon, Côte D'Ivoire, Guinea, Niger, and Nigeria that in some cases have just one or two academic papers and/or in-depth studies on ASM.

<sup>64</sup>Production networks are defined for the first time in relation to ASM as “intricate interconnected horizontal and vertical linkages that are a part of multidimensional and multilayered lattices of economic and social activity” (McQuilken and Hilson, 2018, p. 8).

<sup>65</sup>McQuilken, 2018.

<sup>66</sup>Formerly the International Tin Research Institute (ITRI).

<sup>67</sup>ITSCI, 2018.

<sup>68</sup>These agencies include: United Nations Economic Commission for Africa (UNECA) and representatives from the African Mining Partnership (AMP), International African Development Bank, United Nations Conference on Trade and Development (UNCTAD), and United Nations Industrial Development Organization (UNIDO).

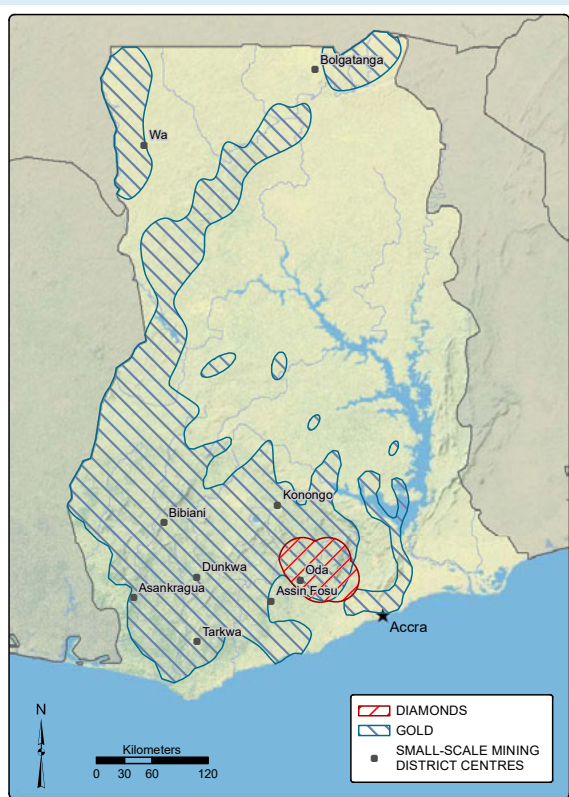
<sup>69</sup>African Union, 2009, p. 32.

<sup>70</sup>Ibid., p. 29.

# Ghana

**Author: James McQuilken**

**Major gold and diamond deposits with estimated ASM areas<sup>71</sup>**



## Materials mined by ASM

- Gold: 1.135 million ounces (produced in 2016)<sup>72</sup>
- Diamond: 86,925 carats (exported in 2017)<sup>73</sup>
- Salt: 250,000 tons (average per year)<sup>74</sup>

<sup>71</sup>Map created by Daniel Stapper. Map data sources: Base map: US National Parks Service, 2017. Gold mines and mineral deposits: Amankwah, 2015 in McQuilken and Hilson, 2016; Guenther, 2018; USGS, 2018. Diamond Mines: Amankwah, 2015 in McQuilken and Hilson, 2016.

<sup>72</sup>MLNR, 2017.

<sup>73</sup>Ghana Chamber of Mines, 2018.

<sup>74</sup>Affam and Asamoah, 2011.



# **Mineral governance framework**

## **Government priorities**

- Lift the current ban on ASM (March 2017 to present)
- Mitigate pollution to the environment and water bodies
- Formalization of the sector through streamlined licensing, geological data, and access to finance

## **Laws and policy**

- The Small-Scale Gold Mining Law (1989)
- Minerals and Mining Act, 2006 (Act 703)
- Multilateral Mining Integrated Project (2017)
- Signatory to Minamata Convention on Mercury
- Operation Vanguard

## **Government institutions**

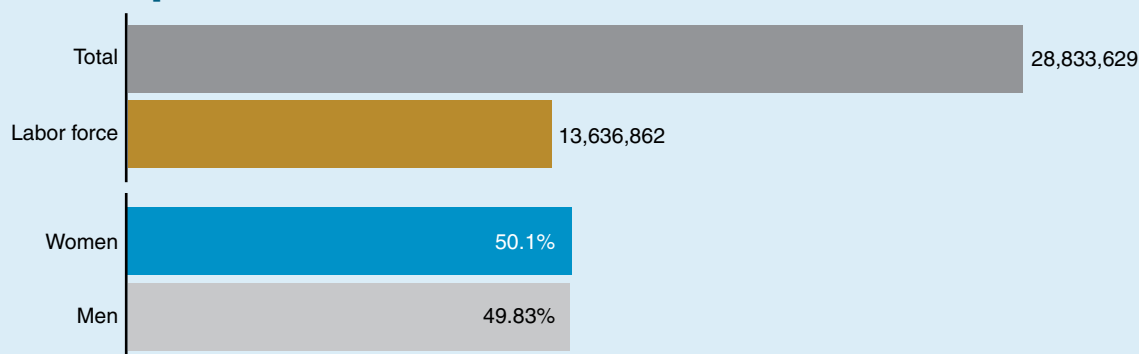
- Ministry of Lands and Natural Resources
- Minerals Commission
- Precious Minerals Marketing Cooperation

## **Associations and member organizations**

- Ghana National Association of Small-Scale Miners (GNASSM)
- Women in Mining Ghana
- The Ghana Chamber of Mines

# Economic and development data

## 2017 Population<sup>75</sup>



## 2017 Classification (GNI per capita)<sup>76</sup>

- Lower middle income: USD 1,490

## 2017 Gross Domestic Product<sup>77</sup>

- USD 47.33 billion

## 2012 Poverty headcount ratio<sup>78</sup>

- Population on/below national poverty line: 24.2%
- Population living on <USD 1.90 per day: 12%
- Population living on <USD 5.50 per day: 60.5%

# Livelihoods

## Employment<sup>79</sup>

- ASM: 1.1 million directly, 4.4 million indirectly
- LSM: 10,503 direct employees, 100,000 indirectly
- Active small-scale licenses: 109 (August 2018)
- ASM informality estimate: 70–80% informal

## Gender participation in ASM

- Women: 45–75%<sup>80</sup>

<sup>75</sup>World Bank, 2017b.

<sup>76</sup>The World Bank classifications for country economies are based on GNI per capita, in current USD and using the Atlas method. See World Bank, 2018b for a detailed explanation of the methodology. The 2017 classification thresholds are low income (<USD 1,005), lower middle income (USD 1,006–3,995), upper middle income (USD 3,956–12,235), and high income (>USD 12,235) (World Bank, 2018a). Individual country values are based on 2017 World Bank data (World Bank, 2018c).

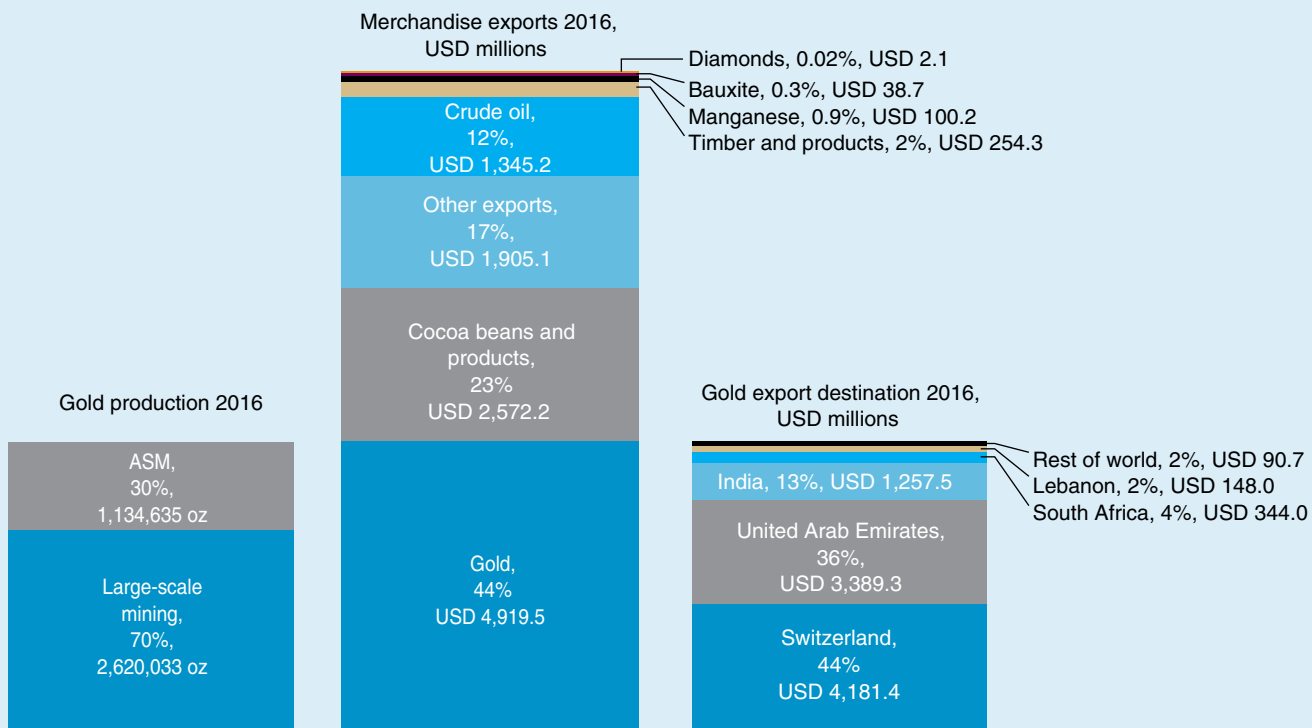
<sup>77</sup>World Bank, 2017b.

<sup>78</sup>World Bank, 2012.

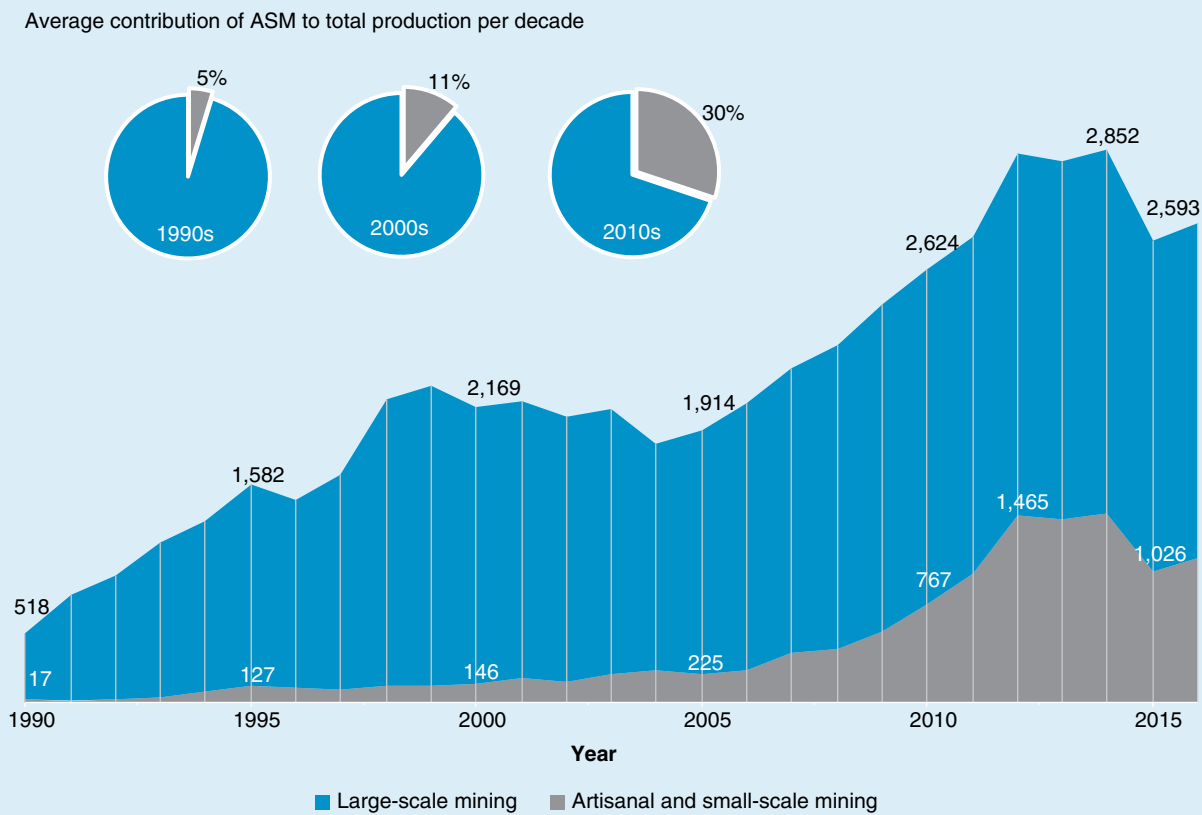
<sup>79</sup>All of the information presented here is from the literature that can be found on the Delve platform. See the Ghana country profile for an in-depth discussion of the employment and informality figures, as well as references to the original sources.

<sup>80</sup>The main minerals industry association representing the collective interests of exploration, mining, and processing companies operating in the country.

**FIGURE 1 PRODUCTION, EXPORT, AND DESTINATION OF GHANA GOLD FOR 2016<sup>81</sup>**



**FIGURE 2 ANNUAL GHANA GOLD PRODUCTION IN THOUSANDS OF OUNCES 1990–2016<sup>82</sup>**



<sup>81</sup>Though depicted side-by-side, there is no relationship between gold produced, exported, and export destination in a given year as these data are from separate sources. Sources (left to right): MLNR, 2017; Bank of Ghana, 2017; The Observatory of Economic Complexity, 2018a.

<sup>82</sup>Sources: MLNR, 2017; multiple data sets cited in McQuilken, 2018.

## **Mining sector summary**

Ghana's minerals sector is dominated by large-scale gold mining, making the country the world's tenth top producer in 2017, and the second largest gold producer in Africa, after South Africa.<sup>83</sup> While gold is also the main commodity extracted on an artisanal and small-scale, diamonds are the second most important in terms of export value, making these two precious minerals the focus of this country profile. Notably, however, Ghana's ASM activities are also essential to the production of a (currently) unquantified amount of construction materials, such as sand, clays, and gravels found throughout the country,<sup>84</sup> as well for salt winning, which is produced largely through solar evaporation along coastal regions. Yet, given the country's dominance in gold stretching back many hundreds of years, it is highly likely that the current ASM employment estimates do not account for development minerals.<sup>85</sup>

Overall, according to currently available official statistics, the ASM sector accounts for approximately 30% of Ghana's annual mineral production,<sup>86</sup> which, if predominantly gold, would have been worth an estimated USD 1,419.1 million in 2016.<sup>87</sup> The sector also supports many millions of jobs. Yet it is characterized by a very high degree of informality and negative impacts on the environment, especially through the release of mercury into water bodies associated with poorly managed gold operations. Better access to and distribution of more complete, accurate, and reliable data to improve the understanding of ASM activities, inform evidence-based policy making, and demonstrate the sector's significant socioeconomic development potential are, as this profile makes clear, desperately needed in Ghana.

## **Mineral governance framework**

The mineral governance framework for ASM in Ghana is based on two key legal instruments:

- The Small-Scale Gold Mining Law, 1989, PNDLC, 218 legalized activities for the first time, allowing for Ghanaian citizens only (aged 18 and over) to purchase an ASM license (of a plot not greater than 0.1 km<sup>2</sup>), and established district centers of the Minerals Commission
- The Minerals and Mining Act, 2006 (Act 703) empowered the Minister of the Ministry of Lands and Natural Resources (MLNR) to designate ASM zones and repealed and replaced earlier laws to consolidate regulations on the sale of mercury and minerals, use of explosives, and the need for an environmental permit<sup>88</sup>

In addition to the key government institutions that regulate ASM (Table 4), the Ghana National Association of Small-Scale Miners (GNASSM) and the advocacy organization Women in Mining Ghana represent the interests and participation of licensed small-scale miners. Though both organizations have active membership bodies, the extent to which they are consulted on decisions and able to effect change remains limited.<sup>89</sup>

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<sup>83</sup>Ghana Chamber of Mines, 2018.

<sup>84</sup>Mustapha and Michae, 2013.

<sup>85</sup>Affam and Asamoah, 2011.

<sup>86</sup>MLNR, 2017.

<sup>87</sup>Calculated by multiplying 1,134,635 ounces produced by ASM in 2016 (MLNR, 2017) by the 2016 average world gold price of USD 1,250.74 per troy ounce (Statistica, 2018).

<sup>88</sup>McQuilken, 2018.

<sup>89</sup>McQuilken, 2018; McQuilken and Hilson, 2018; McQuilken and Hilson, 2016.

**TABLE 4** Key government institutions regulating ASM in Ghana<sup>90</sup>

| Institution                                    | Governance role   |
|--|---|
| Ministry of Lands and Natural Resources (MLNR) | Mandated to ensure the sustainable management of natural resources for socioeconomic growth and development.  |
| Minerals Commission                            | The technical and regulatory body for the minerals sector. Operates a national office in Accra and nine small-scale mining district centers to support applicants and monitor and enforce activities locally. |
| Precious Minerals Marketing Corporation (PMMC) | The main marketing agency for the minerals sector. Licensed to purchase diamonds and gold from ASM, assay all shipments for export, and appoint licensed gold and diamond buying agents.                      |
| Geological Survey Department                   | The technical agency that is also mandated to improve knowledge of geology for small-scale miners, which in turn would help miners access formal channels of finance but lacks the funding to do so.          |

There are many challenges in the mineral governance framework that artisanal and small-scale miners must navigate to become formalized. Despite concerns raised repeatedly about its accessibility and appropriateness<sup>91</sup> and recent support to develop an online repository,<sup>92</sup> the ASM license process has remained a challenging and centralized endeavor since its inception. The 14-step process necessitates the completion of multiple forms, fees, and informal payments (often totaling more than USD 1,000), and approval from different agencies. Each application also requires the signature of the Minister of the MLNR, and the process must be repeated every three to five years in order to renew the license. This complexity disincentivizes and prevents many artisanal and small-scale miners from gaining a license, thus helping to confine them to the informal economy.<sup>93</sup>

The licensing challenges are further complicated by somewhat overlapping and siloed government departments. This is especially true at the local level, where despite ASM being a crosscutting development issue requiring the coordinated effort of all agencies, it is often left solely to the underfunded and understaffed Minerals Commission district centers to address. These issues are made worse by a complex land tenure system, which does little to empower women, who are particularly marginalized (both formally and informally) by Ghana's mineral governance framework, and by wider societal norms. Women in ASM are largely confined to low-paid and labor-intensive roles, struggle to access bank loans without the signature of a male relative, and face gender-based discrimination in owning land, becoming license holders, and managing concessions.<sup>94</sup>

The most recent development, reminiscent of past government task forces, is the ban on all ASM activities across the country, including licensed activities. Carried out as part of the MLNR-led Operation Vanguard, which drew on 400 security personnel to shut down illegal mines and confiscate equipment, the temporary six-month ban has been extended several times and remained in place at the time of writing. Beginning in March 2017, following the assumption of President Nana Akufo-Addo's newly elected New Patriotic Party to office in January of the same year, the ban was implemented with the aim of formalizing and sanitizing the sector before a new roadmap could be deployed to manage activities. However, the ban has been criticized for being a heavy-handed and ineffective strategy over the long term because it does not address the root causes of illegality and informality.<sup>95</sup>

<sup>90</sup>Sources: McQuilken, 2018; McQuilken and Hilson, 2016; McQuilken and Hilson, 2018.

<sup>91</sup>Hilson, 2001, 2007; Hilson and Okoh, 2013; McQuilken and Hilson, 2016; Hilson et al., 2017b.

<sup>92</sup>Financing to develop the online repository was provided by the Australian High Commission, in partnership with technical and implementation support from the Revenue Development Foundation (2015-2017).

<sup>93</sup>Aryee et al., 2003; McQuilken, 2018, pp. 110-113.

<sup>94</sup>Hinton et al., 2003; Yakovleva, 2007; AMDC, 2015; McQuilken and Hilson, 2016; Hilson et al., 2018.

<sup>95</sup>McQuilken and Hilson, 2016; Hilson, 2017.

## Economy

Ghana's economy and foreign exchange earnings depend significantly on the mining sector, particularly gold (Figure 1). For 2016 (January to December), the Bank of Ghana<sup>96</sup> reported that total merchandise exports were valued at USD 11,136.9 million, accounting for 21% of gross domestic product (GDP). Of this, mineral and metal exports totaled USD 5,060.5 million (45%), with gold making up the major share, valued at USD 4,919.5 million and comprising 44% of overall exports. Therefore, gold accounted for more than 97% of total mineral export revenue in 2016. Similarly, in 2017, gold was again the top earner, netting the government USD 5,786.16 million in revenue and accounting for 42% of the total merchandise exports.

To determine ASM's contribution to the national economy, the best available data originate from the Minerals Commission, the agency responsible for promoting and regulating the mining sector and housed under the MLNR. These data show a dramatic increase in the proportion of gold from ASM sources, increasing from an average of 5% in the 1990s to more than 30% over the last decade (Figure 2). Though not readily available as a public data set, again emphasizing the need for the Delve initiative, the production figures given here are from a draft report on the Multilateral Mining Integrated Project<sup>97</sup> that was obtained through a direct communication. In 2016, Ghana produced 3,754,688 ounces of gold, comprised of 2,620,033 ounces (70%) from large-scale mining and 1,134,635 ounces (30%) from ASM.

For diamonds, the figures are drawn from The Ghana Chamber of Mines' 2018 report *Performance of the Mining Industry in 2017*, which states the total amount of diamonds exported by PMMC was 143,005 carats in 2016 compared to 86,925 carats in 2017, a reduction of 39%, which is likely a reflection of the ban on ASM. Uniquely, all diamonds won in Ghana originate from several hundred Tributaries (small-scale mining operations licensed to work on Great Consolidated Diamonds Ltd.'s concession) located in Akwatia, a town in Ghana's Eastern Region.<sup>98</sup>

Here lies a key example of the challenges with data on ASM specifically and mining more generally in Ghana: the need to produce consistent and reliable data sets that enable year-on-year comparison. For example, the Bank of Ghana's *2016 Annual Report* disaggregates merchandise exports by gold, manganese, bauxite, and diamonds, while the *2017 Annual Report* consolidates the latter three under the category of "other exports," making an annual comparison for small-scale diamond mining impossible with this data.

A lack of consistency and accompanying explanations also make easy comparison and reconciliation of figures with other data sets challenging. For example, PMMC's 2016 gold purchase and export figure (also referenced as production) was, as reported by the Ghana Chamber of Mines, 1,570,029 ounces, worth USD 1,999.9 million.<sup>99</sup> This figure can be taken to represent the approximate annual production of ASM, given PMMC's role as a state buyer and exporter of gold and diamonds from the sector. But, without an explanation alongside this data, easily reconciling these figures with the production values quoted from the Minerals Commission<sup>100</sup> at the start of this country profile becomes challenging. Furthermore, the different terminology ascribed to the figure in the same document and again in the 2017 report,<sup>101</sup> where it is referred to as the "gold assayed" by PMMC, adds to the confusion.

A further challenge, and one that Delve needs to consider carefully, concerns the data's origin and, as such, reliability. Despite the Ghana Chamber of Mines' 2017 report referencing the source of the quoted production data throughout the text as "Minerals Commission, 2018," the actual source is missing from the final reference list at the end of the document. This leads the reader to (tentatively) assume that the data has been received via a direct communication with the Commission. If this is true and fully referenced in

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<sup>96</sup>See Bank of Ghana, 2018 for all figures in this paragraph.

<sup>97</sup>MLNR, 2017.

<sup>98</sup>McQuilken and Hilson, 2018.

<sup>99</sup>Ghana Chamber of Mines, 2017, pp. 17, 31.

<sup>100</sup>MLNR, 2017.

<sup>101</sup>Ghana Chamber of Mines, 2018, p. 37.

the document, it would have the added benefit of adding to the credibility and improving the reliability of the report, as well as the data contained within.

## Livelihoods

Despite being the most difficult statistic to accurately quantify on ASM in Ghana, the number of people directly working in the sector, estimated at more than 1.5 million in addition to the 4-5 million supported by its activities, dwarf those in comparison to large-scale mining. The most recent (2017) figure reported by The Ghana Chamber of Mines<sup>102</sup> is that its 12 *producing* member companies directly employ 10,503 people (159 expatriates, 10,344 Ghanaians),<sup>103</sup> down from the previous report of 11,628 (190 expatriates, 11,438 Ghanaians) for the year 2016.<sup>104</sup> The reason, it is stated, is due to the move at several key sites from owner to contract mining and a transition to solely mechanized underground operations. To compare, a 2015 study<sup>105</sup> of seven large-scale gold mines in Ghana,<sup>106</sup> which is based on historical data for the years 2010-2013 (inclusive) and a projected future decline of the national labor force required by such companies from 1.3% in 2013 to 0.6% by 2022, estimates that their sample of large-scale operations employ on average a total of 7,000 people directly, create 66,000 jobs through local sourcing (direct suppliers and supplier's suppliers), and support a combined<sup>107</sup> average total of approximately 111,000 jobs annually (2014-2022).

The breakdown of these figures and projections again highlights the challenges with obtaining accurate and reliable data. Accurate and verifiable estimates on the numbers employed and, crucially, disaggregation by gender, age, education, ethnicity, job type, income, duration, formality, and location are far more challenging, if not nonexistent. Without any countrywide baseline studies, a handful of reports and scholars have instead presented wide-ranging estimates over the years, which have grown steadily from 50,000-300,000 people mining directly in the late 1990s<sup>108</sup> to approximately 1.1 million people directly engaged, and an estimated 4.4 million who today derive a livelihood from associated income-earning activities.<sup>109</sup> The participation rate of women in the ASM sector is equally as challenging to quantify, with estimates ranging from 45-75%, and with 50% being an often-quoted figure.<sup>110</sup>

In terms of (in)formality, and leaving aside the ban, there are a reported 109 active ASM licenses out of 209 on the online repository of the Ghana Minerals Commission.<sup>111</sup> However, this figure is highly unreliable as an estimate for the size of Ghana's formal ASM workforce because it does not include those legally mining on large-scale concessions, such as Tributaries, nor does it indicate how many people each operation employs. Furthermore, a study from the late 1990s estimated 117 licensed and 6,000 illegal mining sites in Tarkwa alone,<sup>112</sup> while a later study of the same town reported 36 licensed concessions in 2008.<sup>113</sup> For a country-wide figure, a number of publications<sup>114</sup> estimate that 70-80% of small-scale mining operations in Ghana are informal, referred to as *galamsey*.<sup>115</sup> This is based on conservative assumptions that there are approximately 1,000 mine sites (licensed and unlicensed), each employing 200-300 people, and a total 1 million people directly engaged in the sector. What is clear from these varied and wide-ranging values is the need for reliable data on the true number of people supported by ASM, those operating informally, and details on their characteristics and backgrounds.

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<sup>102</sup>The Ghana Chamber of Mines is the main minerals industry association representing the collective interests of exploration, mining, and processing companies operating in the country.

<sup>103</sup>Ghana Chamber of Mines, 2018.

<sup>104</sup>Ghana Chamber of Mines, 2017.

<sup>105</sup>International Council on Mining and Metals, 2015.

<sup>106</sup>Adamus Resources; Chirano Gold Mines; Gold Fields, Damang; Gold Fields, Tarkwa; Golden Star Resources, Wassa; Newmont, Ahafo; and Newmont, Akyem; See International Council on Mining and Metals, 2015.

<sup>107</sup>This combined figure includes directly by mining companies, direct suppliers, supplier's suppliers, and re-spending of salaries. <sup>108</sup> ILO, 1999.

<sup>109</sup>UNECA, 2011, p. 69, based on estimates from CASM.

<sup>110</sup>Hilson 2001, 2002; Hentschel et al., 2002; Hinton et al., 2003; Hilson et al., 2018.

<sup>111</sup>Minerals Commission, Ghana, 2018.

<sup>112</sup>Agyapong, 1998, after Hilson, 2001.

<sup>113</sup>Opoku-Antwi et al., 2012.

<sup>114</sup>ILO, 1999; Crawford and Botchwey, 2016; McQuilken and Hilson, 2016.

<sup>115</sup>*Galamsey* is an adulteration of the English phrase "gather them and sell."

## **Key data needs**

In addition to the need for a single platform to collate and allow side-by-side comparison of data sets on ASM in Ghana directly obtained from reliable government sources, listed here are specific data needs for the country that were identified during analysis:

- The true number and location of artisanal and small-scale miners operating in the country, disaggregated by characteristics such as gender, age, education, ethnicity, job type, income, duration, and formality
- Production and export data that are accurate, from reliable sources, and comparable and reconcilable
- Statistical modelling of the economic contribution of current and future government revenues generated from the ASM sector to support the rationale for formalization efforts
- Geological data that quantify the location and value of deposits for ASM activities and zones to enable small-scale operators to access formal financial channels



## Regional profile: East Asia and Pacific

ASM has been studied fairly extensively in East Asia and Pacific. As a region that is scarred by poverty and plagued by conflict and where 13 of 30 countries are vulnerable to climate change,<sup>116</sup> the sector plays an important role in sustaining local livelihoods. Most of the analyses to date focus on small-scale gold mining, in particular the handling of mercury and conflicts with larger companies. Replicating work carried out in Brazil a decade earlier in the early 2000s, a host of studies were carried out in Compostela Valley Province in the Philippines and North Sulawesi in Indonesia that generated baseline data. The data underscored the severity of the mercury pollution problem at local small-scale gold mines.<sup>117</sup> Work on mercury contamination at small-scale gold mines continued in Indonesia in Talawaan and Galangan under the auspices of the UN Global Mercury Project, as well as in Laos. In both countries, which contain most of the region's people who are living below the poverty line,<sup>118</sup> detailed demographic data were collected from studied communities using survey instruments that today could be readily developed into an ASM census instrument.

Papua New Guinea is another country in the region where a considerable amount of analyses on ASM has been conducted. In the late 1990s, a local AusAID-funded ASM project carried out census work and technological implementation.<sup>119</sup> Since then, a raft of studies<sup>120</sup> have painted a fairly detailed picture of the demographics of and activities found in ASM communities. But here, as well as in Indonesia and the Philippines, the collection of comprehensive quantitative data on ASM populations and licensees has proved challenging because all three countries are collections of islands, where ASM activity is often found spread across vast distances by land and oceans from decision-making centers.

Recently, interest has grown in Myanmar, where, since implementation of the new Myanmar Mining Rule in February 2018, local and foreign investment is now permitted. This includes investment in small-scale mining for gold and other precious metals in areas up to four acres, 10 acres for other minerals, and 20 acres for precious stones.<sup>121</sup> Mongolia is another country in the region where, on the back of large-scale investment, interest in gold mining has intensified over the past decade. Several academic studies describe the ASM sector's conditions in the country and share details on who is involved.<sup>122</sup> As the Mongolian profile details, the country has also been the focus of significant support through the Swiss Agency for Development and Cooperation (SDC)'s Sustainable Artisanal Mining Project, which has also included supporting the development of an ASM database and conducting baseline surveys covering around 20% of the operations in the country.

Although available in greater abundance than in South Asia, overall data on ASM in East Asia and Pacific is not sufficient enough in quality and quantity to make informed decisions. Moving forward, valuable lessons can be learned from work carried out by the ACP-EU Development Minerals Programme, which has Fiji as one of its core country cases.<sup>123</sup> Here, research and stakeholder engagement has yielded detailed data on a host of development minerals being mined on a small scale in the country. Various data on production and demand have been calculated and made available, including numbers of river/sand dredging sites (43); quantity of stone needed to build protective coastal infrastructure (500,000 cubic meters); and budgetary commitment to expanding the sector (USD 30–40 million in 2016–2017).<sup>124</sup> But, most of the region's countries do not have such data on hand, and in instances where they do, they lack the capacity to source and readily share the data. Improved ASM data collection methods are imperative in this region of the world, given the complexity of the activities found here and the markets they supply.

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<sup>116</sup>130 million people lack access to power, 600 million lack access to adequate sanitation, and broadband infrastructure and connectivity are lagging. All figures from World Bank, 2018d.

<sup>117</sup>Ayhuan et al., 2003; Drasch et al., 2001; Yumang et al., 2003.

<sup>118</sup>UNDP, 2018a.

<sup>119</sup>Crispin, 2003.

<sup>120</sup>Moretti, 2006; Corbett et al., 2017.

<sup>121</sup>Htwe, 2018.

<sup>122</sup>Lahiri-Dutt and Dondov, 2017; Bose-O'Reilly, et al., 2017; Steckling, et al., 2011.

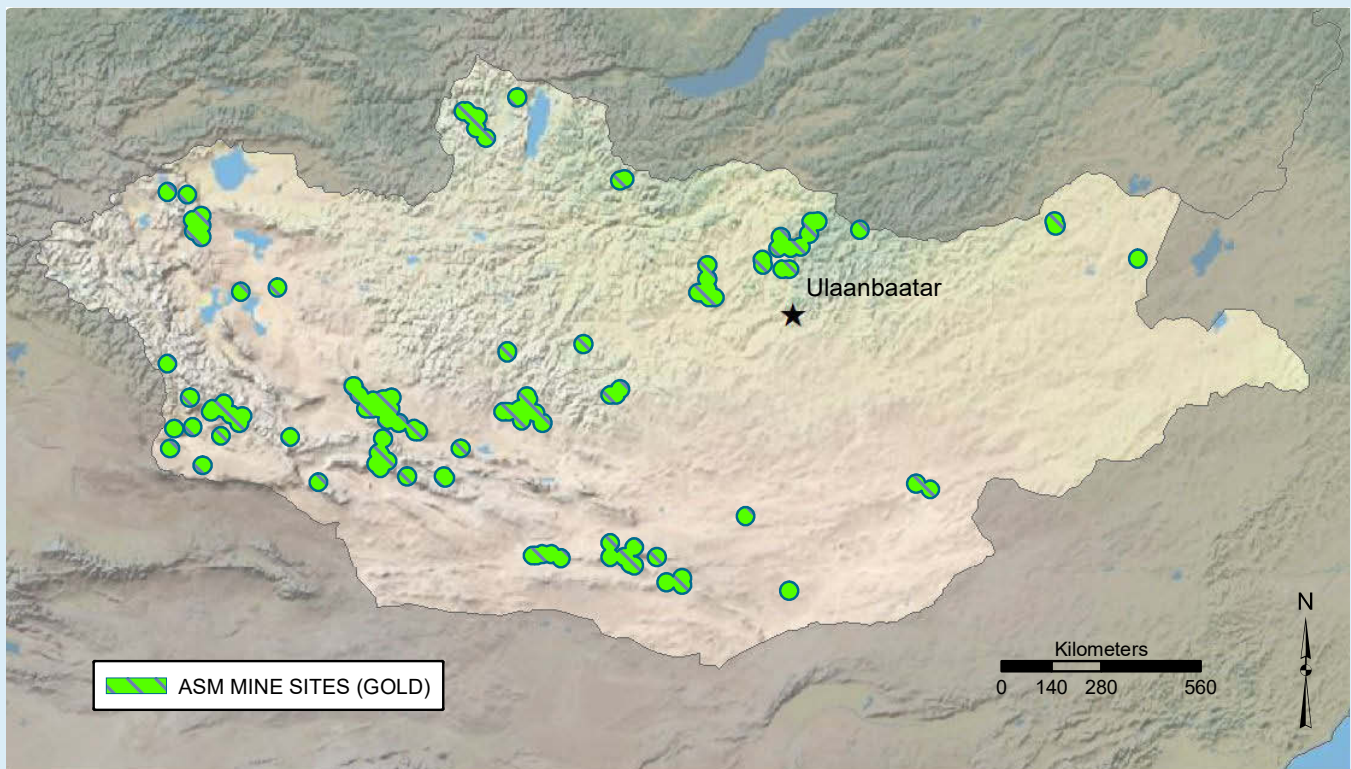
<sup>123</sup>ACP-EU Development Minerals Programme, 2018.

<sup>124</sup>Ibid.

# Mongolia

**Author: Patience Singo**

## **Artisanal and Small-Scale Gold Mining Sites<sup>125</sup>**



## **Materials mined by ASM**

- Gold: 12.7 tons (2017)<sup>126</sup>
- Coal, fluorite, limestone, gemstones, and wolfram

<sup>125</sup>Map created by Daniel Stapper. Map data sources: Base map: US National Parks Service, 2017; NSO, 2017.

<sup>126</sup>Sustainable Artisanal Mining Project, 2018.

# Mineral governance framework

## Government priorities

- Review Law on Minerals and classify mining into artisanal, small, medium, and large-scale
- Improve ASGM contribution to the economy through Gold 2 Program till 2020
- One-stop-shop for ASGM trading in ASM dense areas
- Implementation of the Minamata Convention on Mercury

## Laws and policy

- Law on Minerals 2006 (updated 2009,2010, 2014)
- Law on Land, clause 16.1.11
- Regulation on Extraction of Minerals from Small-Scale Mines, 2010 (amended 2017 to Government Resolution No. 151 of 2017)
- The State Policy on Mineral Resources Sector (2014–2025)
- The Government Action plan 2016–2020

## Government institutions

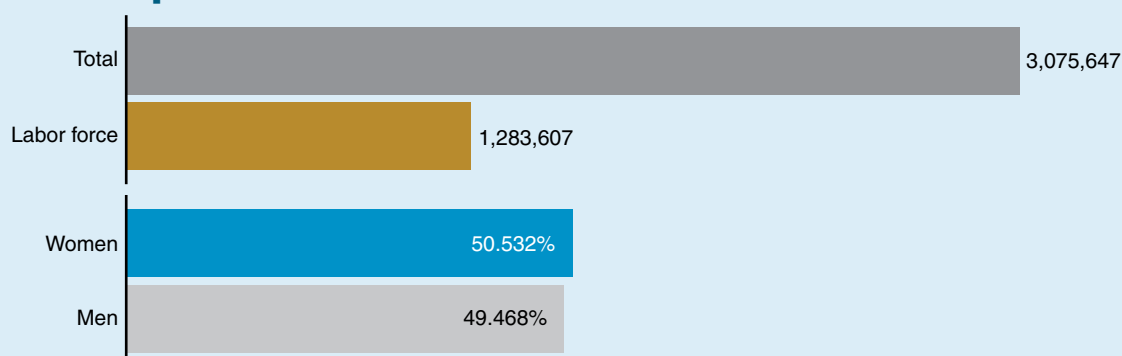
- Ministry of Mining and Heavy Industry
- Minerals Resources and Petroleum Authority (MRPAM)
- Assay Office
- Local Governments
- Bank of Mongolia

## Associations and member organizations

- Mongolia National Federation of Artisanal Miners (MNFA)
- Regional ASM Federations
- Various local ASM associations and NGOs such as the Mongolian National Mining Association

# Economic and development data

## 2017 Population<sup>127</sup>



## 2017 Classification (GNI per capita)<sup>128</sup>

- Lower-middle-income: USD 3,290

## 2017 Gross Domestic Product<sup>129</sup>

- USD 11.488 Billion

## 2016 Poverty headcount ratio (2011 purchasing power parity)<sup>130</sup>

- Population on/below national poverty line (2014): 21.6%
- Population living on <USD 1.90 per day: 0.5%
- Population living on <USD 5.50 per day: 8.1%

# Livelihoods

## Employment (2016)<sup>131</sup>

- ASM: 60,000 directly, 240,000 indirectly
- LSM: 38,200 directly
- ASM permits granted: 113
- ASM informality estimate: 80% informal

## Gender participation in ASM (2016)<sup>132</sup>

- Women: 24%
- Men: 76%

<sup>127</sup>World Bank, 2017b.

<sup>128</sup>Ibid.

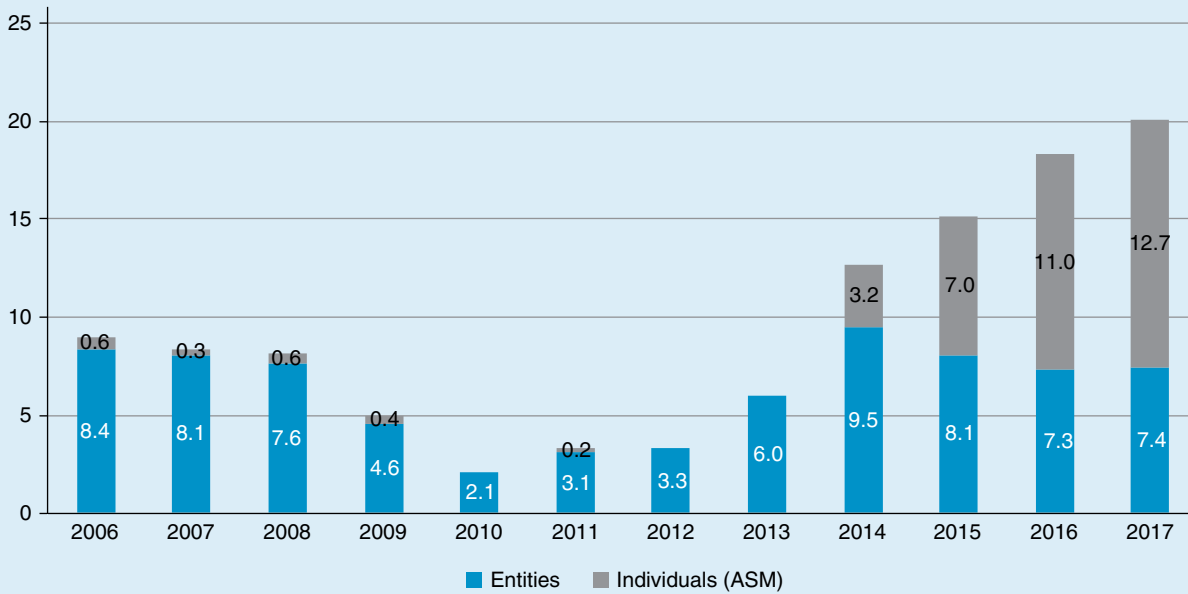
<sup>129</sup>Ibid.

<sup>130</sup>Ibid.

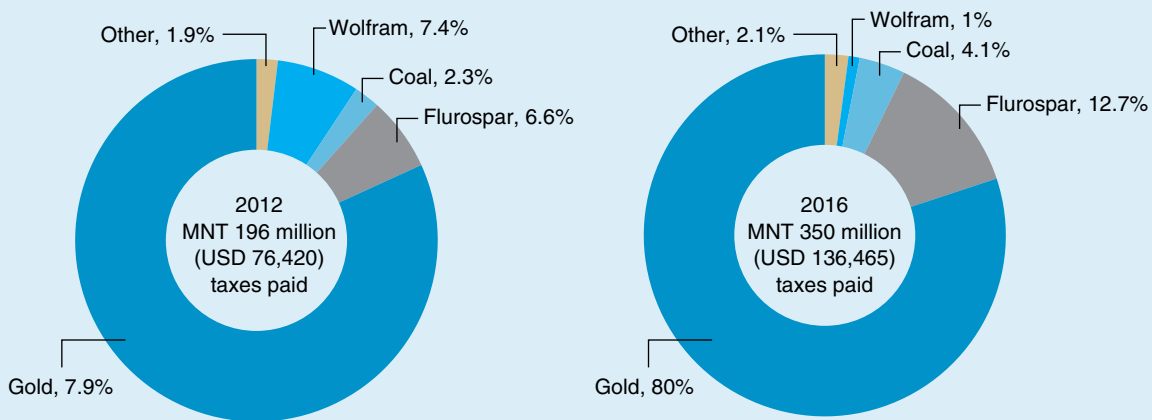
<sup>131</sup>SDC, 2015; NSO, 2016, 2017.

<sup>132</sup>NSO, 2016, 2017.

**FIGURE 3 ANNUAL GOLD SOLD IN TONS TO BANK OF MONGOLIA FROM ENTITIES VERSUS INDIVIDUALS (ASM) 2006-2017<sup>133</sup>**



**FIGURE 4 TAX PAID BY SMALL-SCALE MINERS IN MONGOLIA, 2012 VS. 2016 (MNT)<sup>134</sup>**



<sup>133</sup>Bank of Mongolia, 2018.

<sup>134</sup>Reproduced from the original source. Note that in the original source there are no units given for the 196 and 350 million figures. However, these are confirmed to be reported in Mongolian Tugrik (MNT 1 = USD 0.0003899). This highlights issues of data quality being reported. Furthermore, the tax figures are based on a survey, as opposed to data from official state institutions, again effecting reliability. Source: NSO, 2016.

## Mining sector summary

Mongolia's mining sector is dominated by the large-scale extraction of coal, copper, fluorite, gold, and iron ore. The country has the world's second largest copper reserves<sup>135</sup> and was the sixth top fluorite producer in 2017.<sup>136</sup> Gold is the main commodity mined on an artisanal and small-scale, accounting for approximately 50% of annual national production and 75% of the sector's workforce, followed by fluorite and coal in almost equal shares (10% and 9.5% of ASM activities, respectively).<sup>137</sup> Smaller quantities of limestone, gemstones, and wolfram are also produced through ASM, engaging 5.5% of the sector's workforce, while the production of development minerals can be found near city and provincial centers.

With regard to the availability and reliability of detailed data on ASM, Mongolia has made what can be considered some of the greatest strides in recent years. For the purpose of this report and the wider Delve initiative, Mongolia serves as a "best case" example, having carried out a nationwide survey on ASM to establish a baseline in 2012, which was repeated again in 2016. This country profile demonstrates what can be achieved through a continued and concerted effort to undertake a rigorous countrywide baseline and gather detailed data on the sector and acts somewhat as a gold standard for other countries and programs to follow suit. Yet, it also illustrates the challenges with effectively using large amounts of data.

## Mineral governance framework

The mineral governance framework for ASM in Mongolia is based on a number of key legal instruments and policies, many of which have been updated in recent years. These include:

- Law on Minerals, 2006, governs the exploration and mining relations of all types of mineral resources, except water, oil, natural gas, and radioactive and common minerals. Several clauses have since been updated in 2009, 2010, and 2014. The law includes a definition of small-scale mining; outlines requirements for license holders, mineral exploration, and mining operations; and explains the roles of the national government entities responsible for geology and mining. These are (1) Ministry of Mining and Heavy Industry, and (2) the Minerals Resources and Petroleum Authority of Mongolia (MRPAM). The law also outlines the role of "authorities of local administration and self-government bodies;" and prescribes royalties and penalties for violations.<sup>138</sup>
- Law on Land, 2002, outlines different types of land that are considered "Land for State special needs." Clause 16.1.10, which was added in July 2010, includes "Land allocated for small-scale mining purposes." Land access is through permits granted by the local authority or through a tripartite agreement with a permit holder, the local government, and ASM partnerships.
- Regulation on Extraction of Minerals from Small-Scale Mines, 2010 (Government Resolution No. 308), outlines practical regulations with respect to ASM. Specifically, it outlines the roles and responsibilities of national and district level (*soum*) government with respect to processing small-scale mining permits and land allocation, maintaining a cartographic registry, supporting miners, and supervising and inspecting operations to ensure adherence to occupational, safety, and environmental standards and permits. The regulation also details legal requirements of license holders.
- Government Resolution No. 151 of 2017<sup>139</sup> replaces the 2010 Regulation on Extraction of Minerals from Small-Scale Mines (above) and improves the coordination of ASM interventions and formalization activities by establishing an intergovernmental ASM council and strengthening the roles and responsibilities of provincial (*aimag*) governments. It also increases equipment capacity limitations on mining activities and extends the term of ASM agreements until the resources are totally exhausted, and formalizes the Frugal Rehabilitation Methodology for miners to use in environmental rehabilitation.

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<sup>135</sup>SES Professionals, 2018.

<sup>136</sup>World Atlas, 2017.

<sup>137</sup>NSO, 2017.

<sup>138</sup>Law of Mongolia, 2006.

<sup>139</sup>Government of Mongolia, 2017.



- The State Policy on Mineral Resources Sector (2014-2025) articulates the medium-term strategy for ASM management and development and commits to improving the legal framework and upgrading of the sector.
- The Government Action Plan (2016-2020) aims to advance formalization efforts and increase gold production through regional assaying and buying centers, which are being established in areas of high ASM activity.<sup>140</sup>
- Mongolia is also a signatory to the Minamata Convention on Mercury, which it ratified in 2016, and is currently developing a National Action Plan on ASM.

In terms of licensing, prospective miners must be Mongolian nationals over age 18 years and be a resident in the province or city where the mineral deposits they seek to exploit are located. The process is decentralized through local government, and permits are awarded on a first come first served basis by the local authority. The MRPAM verifies all ASM permit requests against a database of existing mining and exploration areas and issues a mining permit valid for one year if there are no activities already under way in that location. Permits are renewable upon satisfaction of statutory obligations, such as rehabilitation, payment of local taxes, and evidence of the potential for further exploitation. There is no additional permission to access land above ground as ASM land is selected from local government “special use land.”

Crucially, the Mongolian mineral governance framework recognizes the wide variety of ASM operations and their degree of formality. This is beneficial to formalization efforts because it makes obtaining a permit, entry into the formal economy, and, therefore, subsequent access to support services far easier than in many other countries. The three main types of operations that are recognized include unregistered partnerships, cooperatives, and registered partnerships, the latter two of which are considered to be more developed, mechanized, and technologically advanced, and which are supported to access bank loans.

The MRPAM also fulfils a number of technical responsibilities, ranging from: providing training, assistance, and general support to miners, to undertaking surveys and geological mapping, to developing and maintaining a mining cadastre, and identifying and delineating areas suitable for ASM. However, to date, progress in this regard has been slow because the agency has limited resources to undertake such exercises. Perhaps the most important technical role that the MRPAM performs, especially in relation to Delve, is the collection of detailed data on the sector and the maintenance of an ASM database, which was created in 2013 through the Sustainable Artisanal Mining Project with the support of the SDC.<sup>141</sup> As mandated by the Regulation on Extraction of Minerals from Small-Scale Mines, the database is populated annually by data that local government authorities must collect and report, including organizational data on location and numbers of miners, member details, and equipment; economic data on production, income, tax paid, exports, and sales; social data on health, livelihoods, communication tools, and safety and accidents; and environmental data on land degradation and rehabilitation. In 2012, the National Statistics Office of Mongolia (NSO) carried out the first nationwide survey to establish a baseline in this regard and populate the database and repeated the survey in 2016, enabling a comparison over the four-year period. Part of the survey is accessible online through the ASM Knowledge Hub platform, which allows a detailed view of the data by province and county. As a best practice, the 2012 survey data was translated into an ASM Atlas, and published in print and online in both Mongolian and English language, for monitoring and policy advocacy.

In addition to the significant improvements made in data collection, Mongolia has implemented a series of measures to mitigate adverse impacts of ASM operations on the environment. Statistics show a decrease of ASM-destroyed land and an increase in ASM-rehabilitated lands between 2012 and 2016. Also, the use of mercury in gold processing has been largely abandoned due to the establishment of mercury-free processing plants in five key provinces and since the introduction of the Frugal Rehabilitation Methodology, as per the 2017 regulation. However, despite the concerted effort in recent years to improve

<sup>140</sup>MRPAM, 2016.

<sup>141</sup>ASM Knowledge Hub, 2018.

the mineral governance framework and data collection and availability on the sector, there is still a need to harness this information to translate it into effective policy making. Although more than 72 ASM associations and NGOs have been created in recent years, an estimated 80% of miners remain informal and lack technical support and investment. Furthermore, a major limitation of the nationwide surveys is that they covered only about 15-20% of miners in the country. Meanwhile, there is also significant variation in the quality, type, and methods used by different government agencies<sup>142</sup> to collect the wide variety of ASM data on an ongoing basis, and there is no integrated platform to bring this information together. As such, there is still a need for a more comprehensive, sector-wide approach for collecting and collating ASM data in one place and for using it for effective policy making.

## **Economy**

Mongolia's economy and foreign exchange earnings depend significantly on the mining sector, particularly coal, copper, fluorite, gold, and iron ore. In 2017, the Bank of Mongolia reported that merchandise exports were valued at USD 6,201 million. Of this total, mining contributed USD 5,519 million (89%), with gold making up USD 595 million and comprising 9.6% of overall exports.<sup>143</sup> Of the gold production sold to the Bank of Mongolia in 2017 (Figure 3), ASM produced 12.7 tons (63%).<sup>144</sup> While there is good data on mineral production and exports from the Customs Office and the NSO, aside from gold, none of the other commodities are disaggregated between ASM and large-scale operations, thus poorly accounting for ASM's contribution to annual mineral production. However, some of the artisanal and small-scale gold mining (ASGM) production is assumed to be declared by medium-sized companies to avoid paying high income tax (see Figure 4), demonstrating challenges with robust data collection.

There are a number of very useful statistics and data being collected in Mongolia that helps to paint a picture of its significant economic potential. In terms of gross revenue generated by ASM, the 2016 NSO survey reports that ASM generated 22 billion MNT (USD 9.2 million). This was a decrease compared to gross revenues of MNT 25.4 billion (USD 18.1 million) in 2012. However, these figures only include data from around 20% of the ASM population, thereby significantly underestimating the vast value and potential of the sector for economic growth and development. Another interesting statistic collected by the NSO is investment in things such as buildings, vehicles, equipment, and personal assets. In 2016, ASM invested a total of MNT 1.5 billion (USD 625,000), compared to MNT 2.1 billion (USD 1.5 million) in 2012.<sup>145</sup> A 2015 SDC study covering 10 counties estimated ASM's direct monthly contribution to the local economy to be MNT 8 billion (USD 4 million), indirect monthly contribution to be MNT 1.5 billion (USD 750,000), and the economic multiplier to be 1.189. Combined, these data provide a glimpse of enormous economic potential that the sector has in terms of its contribution to GDP, investment and taxation, and linkages to other economic activities. However, without data that cover the whole country or even a truly representative sample, desegregate between ASM and LSM, or are regularly shared and reported, knowledge on the exact contribution of ASM to the economy will remain limited.

## **Livelihoods**

An estimated 60,000 people directly engage in ASM in Mongolia, and approximately 240,000 are dependent on the sector for their livelihood.<sup>146</sup> To compare and contextualize the livelihood contribution of ASM, in 2016 LSM employed 38,200 people, meaning that ASM directly employed almost twice the number of individuals, most of whom do not have professions or tertiary qualifications.<sup>147</sup> In terms of geographical spread, ASM activities occur in 19 of 21 provinces, making it an important livelihood activity across the country. According to the NSO 2016 data, ASM provides 11.1% of miners with permanent

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<sup>142</sup>Major ASM data providers include the local government, MRPAM, Ministry of Labour, General Social Insurance Office, Assay Office, Bank of Mongolia, ASM associations, and the National Federation of Artisanal Miners.

<sup>143</sup>Bank of Mongolia, 2017.

<sup>144</sup>Sustainable Artisanal Mining Project, 2018.

<sup>145</sup>NSO, 2017.

<sup>146</sup>SDC, 2015.

<sup>147</sup>NSO, 2017.



employment and 68.3% with regular income. Yet, while surveys such as these have been carried out in an attempt to establish a baseline of the sector's livelihood dimensions, due to a lack of registration of miners and widespread informality, the true value and extent of the contribution of ASM to local wealth and job creation are not well quantified. Furthermore, the wide variety of ASM-supported activities means that the surveys carried out to date have not been able to fully capture the full extent of the sector's livelihood dimensions.

## **Key data needs**

Rather than a lack of data, the challenge in Mongolia is ensuring that the large amount of data being generated by various national-, provincial-, and district-level government agencies is accurate, reliable, and comparable and that it is collated in one accessible place so it can be used in an effective and manageable way to inform policy making.

- Develop standardized methods of data collection and harmonize reporting across government agencies and institutions
- Enhance and harmonize the existing ASM Knowledge Hub and various mining databases into one platform to collate, consolidate, present, and allow side-by-side comparison of economic and social data sets, with reliable inputs authorized by government sources
- Extend the nationwide surveys to capture a greater proportion of ASM activities, which are currently based on research conducted with 13,000 of the 60,000 miners estimated to operate in the country
- Collect accurate data that are disaggregated by ASM and LSM, different commodities (especially coal and fluorite), gender, and direct and indirect employment
- Collect geological data that quantify the location and value of deposits for ASM activities and zones to enable small-scale operators

## Regional profile: Latin America and the Caribbean

In 1999, an estimated 650,000 artisanal and small-scale miners operated across 17 countries in Latin America and the Caribbean.<sup>148</sup> Today, more than 2.2 million people directly engage in ASM (Table 3). Generally, of the three regions of the developing world, Latin America and the Caribbean has the most detailed and up-to-date data available on ASM. There is no single explanation for this, but it is likely due to a combination of factors, including:

- The region's lengthy history of state intervention in the extractive industries
- Cohesive community-led movements that have sought to claim ASM for local groups and that have galvanized public support for assistance
- The sector's lengthy history brought to the attention of the Spanish and Portuguese empires during early precolonial expeditions to South and Central America
- The environmental impact of operations on the Amazon rainforest, an issue that has been widely explored and reported for more than three decades

This last point first provided a platform to gather data on ASM in the region. Beginning in the 1980s, Brazilian-based scientists began to document mercury contamination levels linked directly to the *garimpeiro*-led gold rushes taking place in the Amazon Basin.<sup>149</sup> Buoyed by broader global concerns surrounding the destruction of the rainforest, this early work inspired parallel investigations on ASM and mercury contamination from the mid-1990s through the early 2000s in other countries in the Amazon, including Colombia, Ecuador, Guyana, Suriname, and Venezuela.<sup>150</sup> A decade later, Brazil and the wider Amazon basin became a major centerpiece of the multimillion dollar UNIDO Global Mercury Project (2004-2008), which spawned a series of investigations that gathered a range of additional environmental data. The Global Opportunities for Long-Term Development (GOLD) program (2017), an intervention funded by the Global Environmental Facility (USD 45.2 million) and expected to attract cofinancing of more than USD 135.1 million, will continue to generate data on mercury contamination from ASGM activities.<sup>151</sup>

While efforts to gather data on mercury contamination over the past three decades in Latin America and the Caribbean have been comprehensive, at the same time, region-wide moves made to collect complementary social and economic information about the sector have been disappointing. Organizations have failed to take advantage of the momentum generated by moves to clean up the Amazon. In certain countries where mining associations are well resourced, and ASM is in a fairly advanced level of development and fairly active in regulating activities and the purchasing of gold, valuable data are readily available.<sup>152</sup>

However, there has been only limited progress in other countries to gather such information. The list includes Bolivia, Suriname, Venezuela, and most countries in Central America, for which data on ASM production, taxation, and geology are either outdated or simply unavailable. But, significantly, with perhaps the exception of Venezuela, where the political situation is currently unstable, these crucial gaps could very easily be filled through ongoing efforts being made under the auspices of the Minamata Convention to address the mercury pollution problem in ASM and on the work being undertaken by ARM and Fairtrade International to identify, certify, and export from producers of ethical and traceable gold

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<sup>148</sup>ILO, 1999.

<sup>149</sup>Martinelli et al., 1988; Pfeiffer and Lacerda, 1988; De Lacerda et al., 1989.

<sup>150</sup>Olivero et al., 1995; Appleton et al., 2001; Tarras-Wahlberg et al., 2001; Charlet et al., 2003.

<sup>151</sup>Global Environment Facility, 2018.

<sup>152</sup>See Guyana and Peru country profiles.

through their separate Fairmined Gold and Fairtrade Gold schemes.<sup>153</sup> Beginning in Bolivia, Colombia, and Peru, these schemes have been in place for almost a decade and provide yet another opportunity to gather complementary census, geological, and production data in these countries, as well as an impetus for collecting similar information through reconnaissance analyses commissioned in the lesser-known terrains, such as those identified above. The data available for ASM in Latin America are quite skewed, for the most part promising in a small group of countries, but lacking altogether in most other locations in the region.

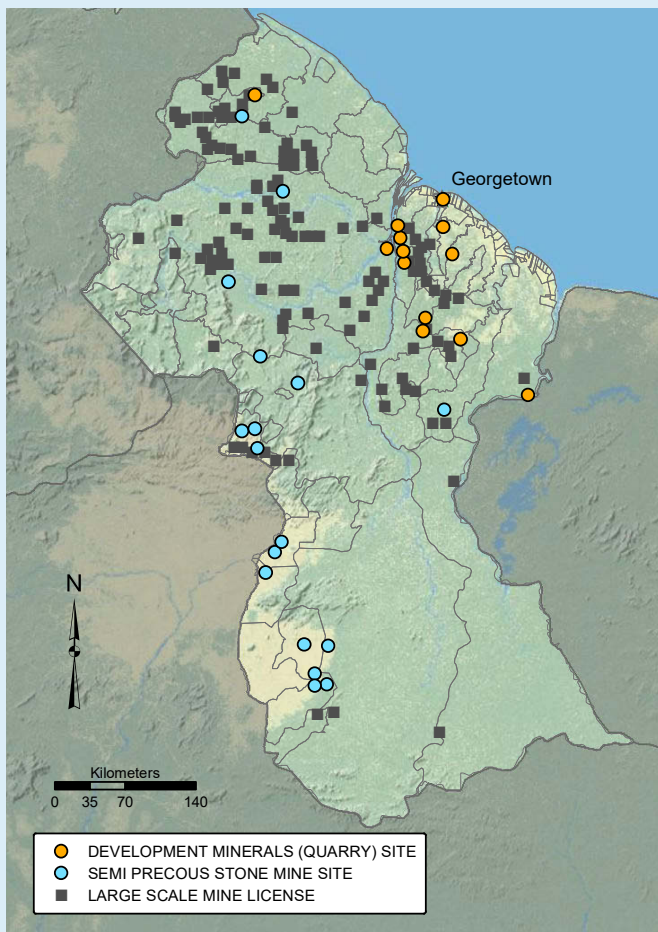
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<sup>153</sup>McQuilken, 2016; Hilson and McQuilken, 2016; Hilson et al., 2016.

# Guyana

**Authors: James McQuilken, Urica Primus, and Ekwa Smith**

## ***Distribution of ASM minerals<sup>154</sup>***



## **Materials mined by ASM<sup>155</sup>**

- Gold: 481,103 ounces (declared total production of ASM and LSM in 2013)
- Diamond: 55,930 metric carats (declared production of ASM and LSM in 2013)
- Development minerals (sand, stone, loam)

<sup>154</sup>Map created by Daniel Stapper. Using base map from US National Parks Service, 2017 and data from GeoNode, 2018 data platform. However, the map does not show many of the known deposits and licensing areas as shown in maps in Pasha et al., 2017. The exercise and challenges of developing customized ASM maps for each country profile also demonstrate significant data gaps.

<sup>155</sup>Pasha et al., 2017.

# **Mineral governance framework**

## **Government priorities**

- Encourage growth and foreign direct investment in mining
- Address issues of under-declaration of gold production by miners and buyers
- Develop harmonized data collection and collation methods, software systems, and data platforms

## **Laws and policy**

- Guyana Geology and Mines Commission Act 1979 (amended 1987)
- Guyana Gold Board Act, 1981
- Mining Act, 1989 (Cap. 65:01) and its amendments and regulations
- Occupational Health and Safety Act (Cap. 99:04), 1997 (amended 2009)
- Amerindian Act, 2006

## **Government institutions**

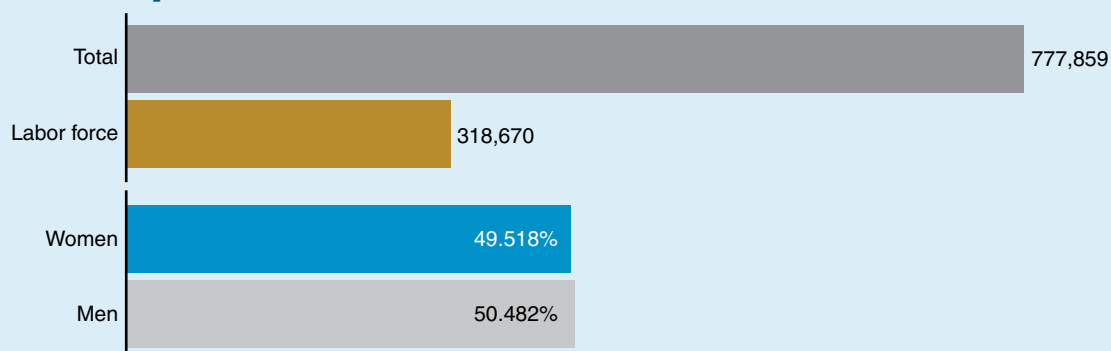
- Ministry of Natural Resources
- Guyana Geology and Mines Commission
- Guyana Gold Board

## **Associations and member organizations**

- Guyana Women Miners Organization (GWMO)
- Guyana Gold and Diamond Miners Association (GGDMA)
- National Mining Syndicate (NMS)

# Economic and development data

## 2017 Population<sup>156</sup>



## 2017 Classification (GNI per capita)<sup>157</sup>

- Upper middle income: USD 4,460

## 2017 Gross Domestic Product<sup>158</sup>

- USD 3.676 Billion

## Poverty headcount ratio<sup>159</sup>

- No data

# Livelihoods

## Employment<sup>160</sup>

- ASM: 10,000–35,000
- Dredging permits: 1,203 (in 2013)
- Small-scale claims: 19,471 (in 2013)

## Gender participation in ASM

- Women: unknown

<sup>156</sup>World Bank, 2017b.

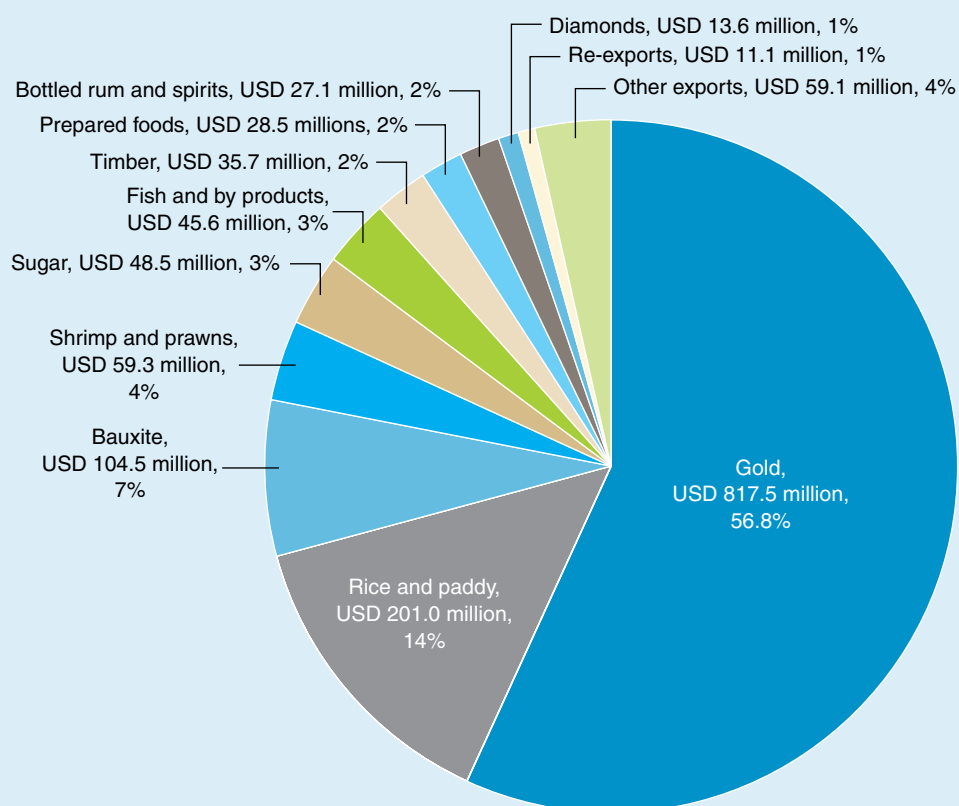
<sup>157</sup>Ibid.

<sup>158</sup>Ibid.

<sup>159</sup>Ibid.

<sup>160</sup>Various sources. See Guyana country profile text under “livelihoods.”

**FIGURE 5 GUYANA EXPORTS BY ITEM AND VALUE, JANUARY TO DECEMBER 2017<sup>161</sup>**



**TABLE 5 NUMBER OF REGISTERED DREDGES AND LICENSE HOLDERS IN GUYANA BY CATEGORY<sup>162</sup>**

|                    | 2006  | 2007   | 2008   | 2009   | 2010   | 2011   | 2012   | 2013   |
|--------------------|-------|--------|--------|--------|--------|--------|--------|--------|
| Registered dredges | 1,617 | 1,794  | 2,072  | —      | 3,102  | 1,524  | 1,803  | 1,203  |
| Small-scale        | 9,408 | 10,563 | 12,582 | 13,476 | 14,355 | 15,032 | 18,610 | 19,471 |
| Medium-scale       | 270   | 374    | 550    | 646    | 742    | 1,161  | 1,546  | 1,979  |
| Large-scale        | 10    | 10     | 10     | 11     | 7      | 12     | 9      | 16     |

<sup>161</sup>Guyana Bureau of Statistics, 2017.

<sup>162</sup>Various sources as reported in Bulkan and Palmer, 2016, and Pasha et al., 2017.

## Mining sector summary

Guyana has a long history of mining, rumored at one time by 16th Century European explorers to be the possible home of the mythical lost city of El Dorado—said to contain vast riches of gold.<sup>163</sup> To this day, Guyana remains known for its significant deposits of gold, as well as diamond and bauxite, around which formalized and regulated mining activities began to emerge in the 1880s. A unique feature of the Guyanese ASM landscape, this long-established security of tenure has promoted greater investment in ASM operations and resulted in a wider level of mechanization, organization, and formalization than may be found elsewhere. Mining has played and continues to play a very important role in the development of the Guyanese economy. In the absence of any substantial and sustained large-scale activities and land-use competition with agriculture, ASM has enjoyed a relative level of support over the years and dominates mining activities in the country. However, while a relatively large amount and variety of data are being collected and generated (though gaps do certainly exist), more robust and unified database management systems are needed to use the details and information effectively and make it more accessible.

## Mineral governance framework

All mining activities in Guyana are regulated and managed by the Guyana Geology and Mines Commission (GGMC). Set within the Ministry of Natural Resources,<sup>164</sup> the GGMC is a semiautonomous state agency that combines regulatory, law enforcement, and technical functions and is divided into five divisions: Geological Services, Mines, Environment, Petroleum, and Land Management. The GGMC reports to a board of directors, including the Minister of Natural Resources, and oversees the administration of the sector according to six geographical districts.<sup>165</sup>

The Mining Act of 1989 is the main regulatory instrument for the sector, stipulating that the state is the owner of all subsurface mineral rights in the country and authorizing the GGMC to manage and regulate activities and award prospecting permits and mining licenses for gold, diamonds, stone, and sand. Prior to obtaining a mining license, all activities (including ASM) must undertake a formal period of exploration. The GGMC issues three categories of prospecting permits: small-, medium-, and large-scale, all valid for one year. The small-scale permit costs approximately USD 2.50 and, like the medium-scale, are reserved for Guyanese citizens, making them easily accessible. Small- and medium-scale prospectors may also enter into joint ventures with foreign investors. Once an ASM claim has been located, prospective miners must mark all four corners with claim boards stating the name of the area, permit number, and date of location; inform the GGMC within 60 days; and complete a notice of location. After the GGMC inspects the claim, the prospective miner can apply for a license. Additional requirements (e.g., environment management agreement, use of mercury retorts, life-cycle plans) are needed for medium- and large-scale prospectors. There are four types of license categories with different requirements (Table 6).

**TABLE 6** Mining license categories in Guyana<sup>166</sup>

| Type                                     | Details   |
|--|---|
| River location (dredger) and Small-scale | River: No longer than one mile of navigable river, cost USD 10.00 per acre per annum (presumed to be per mile)<br>Small-scale: 1,500 feet long by 800 feet wide (27.5 acres or 11 hectares), cost USD 5.00 per acre per annum<br>Both river and small-scale licenses: <ul style="list-style-type: none"><li>• No topographic description required</li><li>• Guyanese only, joint venture with foreigners allowed</li><li>• Must be renewed annually</li><li>• Gold must be sold to buyer licensed by the Guyana Gold Board (GGB) or authorized buyers</li><li>• Environmental guidelines and advisories</li><li>• Legal requirement for environmental permit not enforced</li><li>• Costs USD 10.00 (presumed to be per mile)</li></ul> |

<sup>163</sup>El Dorado translates to “the golden one” in Spanish.

<sup>164</sup>The Ministry of Natural Resources has three government agencies: Guyana Gold Board, GGMC, and Guyana Forestry Commission.

<sup>165</sup>The mining districts are named One to Six and cover Berbice, Potaro, Mazaruni, Cuyuni, North West, and Rupununi.

<sup>166</sup>Government of Guyana, 2012.



| Type         | Details  |
|--------------|--|
| Medium-scale | <ul style="list-style-type: none"> <li>• 150–1,200 acres (61–486 hectares)</li> <li>• Costs USD 1.00 per acre per annum</li> <li>• Topographic description required</li> <li>• Guyanese only, joint venture with foreigners allowed</li> <li>• Renewable every five years</li> <li>• Gold must be sold to buyer licensed by GGB or authorized buyers</li> <li>• Environmental Management Agreement must be signed</li> <li>• Legal requirement for environmental permit not enforced</li> </ul>  |
| Large-scale  | <ul style="list-style-type: none"> <li>• 500–12,800 acres (202–5,180 hectares)</li> <li>• Costs USD 5.00 (foreign ownership) per acre per annum</li> <li>• Topographic description required</li> <li>• 100% foreign ownership allowed</li> <li>• License value for 20 years</li> <li>• Requires proof of financial and technical capabilities, lodging of performance bond, and submission of progress reports</li> <li>• Gold can be exported direct from mine site</li> <li>• License to mine on a property</li> <li>• Environmental Impact Statement and Environmental Management Plan must be submitted</li> </ul> |

In addition to regulating the sector throughout the mining life cycle, the GGMC is also responsible for being the main repository for all geological and geophysical data for industry. However, despite repeated attempts since the 1990s and again in 2012 and 2015 to develop an integrated land-use management plan and associated management database, there are still challenges with overlapping land-use claims. This is because the various natural resource commissions operating under the Ministry of Natural Resources use separate GIS systems software.<sup>167</sup> There is therefore a need to improve the coordination of data collection, sharing, and use through an integrated online platform. The GGMC also faces challenges with implementation at the local level and needs more support to improve its capacity and effectiveness in this regard. In some cases, single GGMC offices, with staff of approximately 10 people, may be responsible for areas as large as 30,000 km<sup>2</sup> containing several thousand licensees.<sup>168</sup> Despite the mineral governance framework for ASM in Guyana being relatively robust on paper, in reality, as is the case of many institutions in developing countries, the GGMC needs more funding, staffing, and support in order to improve its efficiency and effectiveness.

A second notable agency is the GGB, which markets and is responsible for overseeing all gold bought and sold in the country. Created by the Guyana Gold Board Act, 1982, it prescribes that only the Board and Licensed Gold Dealers (of which there are nine to facilitate the purchase of gold from sellers located across the country) can buy and sell the precious metal at a standard price, which is fixed twice daily. The GGB has offices in Georgetown, Bartica, and Charity.<sup>169</sup>

A final key piece of the mineral governance framework in Guyana is the Amerindian Acts of 1976 and 2006. There are approximately 80,000 Amerindians in Guyana, the majority of which are located in the hinterland. Ninety-seven of the 138 communities hold legal title to aboveground resources covering approximately 14% of the country. Gold mining on Amerindian titled land is regulated by Sections 48-53, which require that ASM activities have good faith negotiations with village councils, get consent of at least two-thirds of the community eligible to vote, and comply with all rules. While the GGMC has the power to issue concessions over Amerindian land, a village can veto small- and medium-scale operations. The acts also stipulate that communities must receive a minimum of 7% tribute for use of their land.<sup>170</sup>

<sup>167</sup>Bulkan and Palmer, 2016.

<sup>168</sup>Clifford, 2011.

<sup>169</sup>GGB, 2018.

<sup>170</sup>Bulkan and Palmer, 2016, p. 677.

## Economy

Guyana is a country with diverse natural resources. In terms of contribution to GDP, in 2017, services account for approximately 50%; second was agriculture, forestry, and fishing at 16%; and third was the mining and quarrying sector at 13%. Of this, gold mining contributed 10% to total GDP, bauxite 1.2%, and “other” 1.6%.<sup>171</sup> Gold (unrefined) was the leading export in 2017, worth USD 817.5 million and accounting for over 50% of the total value of exports in the same year (Figure 5).

While the GGMC does not regularly publish data on gold production disaggregated by small and medium concession holders, a recent publication by Bulkan and Palmer (2016) presents a line graph that shows artisanal gold production in troy ounces against percentage of GDP over the years 1990-2014. The sources for these primary data appear to be directly from the GGB, Bank of Guyana, and Bureau of Statistics but are not included in the reference list. The figures report that in 2014, artisanal gold mining in Guyana produced approximately 1,500,000 troy ounces, valued at almost 15% of GDP.<sup>172</sup> Comparing this figure with the value of gold exported in 2017 suggests that artisanal gold mining may account for approximately 37.5% of gold production. This is supported by the detailed data contained within the Bank of Guyana’s 2017 report which states that “*total gold declaration was recorded at 653,753 troy ounces*” and that small- and medium-scale miners “*represent nearly two-thirds of total declarations.*”<sup>173</sup> However, the figures for artisanal gold production shown in the graph for 2014 and that of the previous year (2,000,000 troy ounces) do not tally well with the 481,103 ounces of total gold declared by all mining districts in 2013.<sup>174</sup> There is an obvious need to reconcile these data sets, with one possible explanation being issues with under-declaration.<sup>175</sup>

Guyana has carried out a series of economic reforms since the late 1990s to liberalize the mining sector, and there has been an intensification of natural resources extraction in the interior, in part through awarding mineral and forestry concessions to multinational companies. Guyana’s mining sector has been identified as a vital and very significant potential driver of economic growth, and the government is actively working with the industry to support growth and attract foreign direct investment. Looking ahead and based on statements made during the November 2017 budget speech, the mining and quarrying sector for the year was anticipated to contract by 1.9%, compared to the 46.1% expansion in 2016. While gold declarations were expected to remain stable, bauxite production and other mining activities were said to decline by 2.3% and 12.6%, respectively. Gold declaration was expected to amount to approximately 712,706 ounces for 2017.<sup>176</sup>

## Livelihoods

The exact number of people engaged in ASM activities in Guyana is challenging to accurately determine. One 2005 study provided a range of 10,000-12,000 people, based on the number of registered ASM dredges and an estimate of the average number of people working each dredge.<sup>177</sup> However, another scholar noted in 2011 that “*this is likely to be a conservative estimate, both for the time it was put forward and certainly now, given the scale and growth of the sector in recent times; gold production has more than doubled since 2005, from 116,527 oz to 305,178 oz being registered with the GGMC in 2009.*”<sup>178</sup> The author goes on to suggest that if using the ILO’s much-cited ratio of 100 million individuals dependent on a global ASM sector of 11-13 million, it could be calculated that there are 100,000 people working in ASM in Guyana, equivalent to 12-14% of the country’s population of 763,437 in 2010.

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<sup>171</sup>Bank of Guyana, 2017, p. 145.

<sup>172</sup>Bulkan and Palmer, 2016, p. 684.

<sup>173</sup>Bank of Guyana, 2017, p. 11.

<sup>174</sup>Pasha et al., 2017, p. 9.

<sup>175</sup>Walrond et al., 2015; Bulkan and Palmer, 2016.

<sup>176</sup>Cooperative Republic of Guyana, 2017.

<sup>177</sup>Lowe, 2006.

<sup>178</sup>Clifford, 2011.

Other sources, all of which are referenced in a paper by Bulkan and Palmer (2016), provide additional data with which to gain an understanding of the sector's size and extent. In 2011, there were 15,032 small-scale claim licenses, up from 10,563 in 2007, thereby showing an increase of roughly a third. Meanwhile, in 2013, there were 1,203 registered river dredges; yet this does not include the unregistered dredges estimated to number 9,000 in 2005. Table 5 depicts these figures, which are from a separate source,<sup>179</sup> thereby providing some degree of triangulation, given that neither author cites the other paper as the data source. Taking these figures alone would reach a total in excess of 25,000 claims/dredges, which does not account for the number of people employed by each operation (or whether they are active), nor those engaged in associated livelihood activities. Meanwhile, the IGF (2017) reported a maximum of 35,000 in 2014 and an average of 30,000 based on a review of the literature. Clearly there is a need for a baseline study and ground-truthing exercise to be carried out in Guyana.

In terms of organizational arrangements, as elsewhere, ASM activities in Guyana are unique and a product of the surrounding historical, geological, and social context. In particular, the very early emergence of a formalized ASM sector in the 1880s, which was a product of trying to fairly manage the growing scarcity of near-surface gold deposits at the time, it is argued, has ensured security of tenure encouraging miners and sponsors to invest in their activities, thereby resulting in more mechanized and formalized operations. Second, due to the country being large relative to its population and with 90% of inhabitants and agricultural activities found in coastal regions while gold deposits are located inland, miners in Guyana have not had to compete with other land-use activities, meaning ASM has had a relative level of support, stability, and productivity over the years. There are also few large-scale mines in Guyana, again meaning that ASM has not had to compete for land or state support. Further, many mining operations often employ members of indigenous Amerindian communities in their mining operations because they prefer to hire community members to work in areas that far from their homes.

While there is basic socioeconomic information, such as declared gold sales and license applications, much of the data are contained within applications to the GGMC, aggregated at district and national levels, and not easily accessible remotely. There is also little to no livelihood information on exact numbers, ethnicity, nationality, ages, gender, educational levels, and qualifications and income of miners.<sup>180</sup>

## **Key data needs**

- Developing a harmonized and comprehensive land-use database and GIS system
- Clarifying the role of women in ASM
- Disaggregating data between ASM and LSM activities
- Reconciling declared production and actual production of gold and diamonds
- Establishing remote access and sharing of data collected and held by government institutions, such as GGMC and GGB
- Detailed and disaggregated livelihood and economic data

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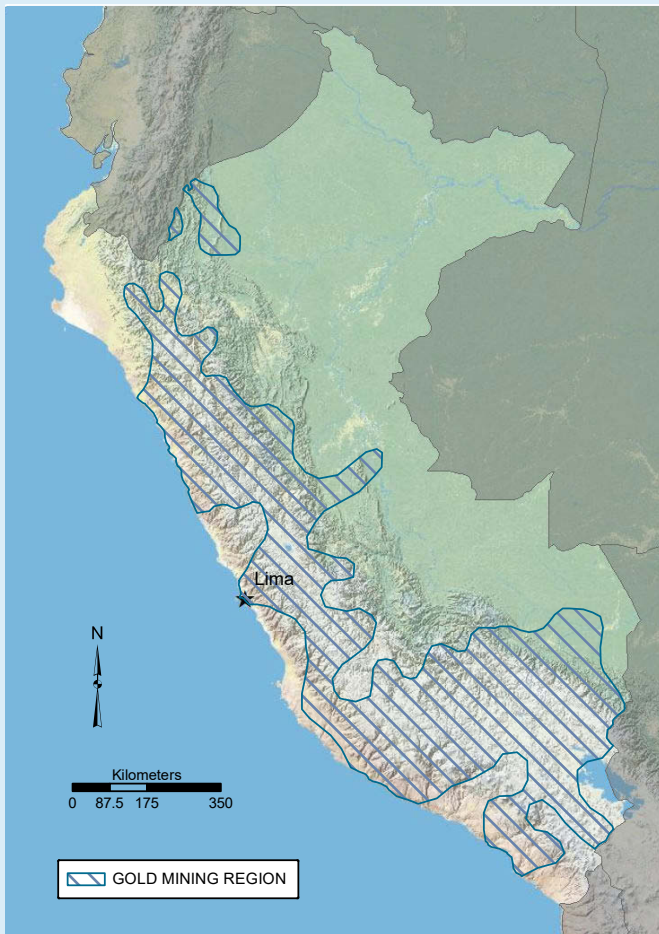
<sup>179</sup>Pasha et al., 2017.

<sup>180</sup>Clifford, 2011.

# Peru

**Author: Sally Faulkner**

**Gold mining regions shown as 20 km buffer around known small-scale mines and deposits<sup>181</sup>**



## Materials mined by ASM

- Gold: 890,000 ounces in 2016<sup>182</sup>
- Copper: Unknown
- Coal: Unknown

<sup>181</sup>Map created by Daniel Stapper by applying a 20 km buffer around gold mines (and mineral deposits containing gold) as identified in USGS, 2010a, 2010b.

<sup>182</sup>Ministry of Energy and Mining (data from direct communication with country profile author).

# Mineral governance framework

## Government priorities

- Mitigate deforestation of the Amazon and mercury pollution
- Formalization of the sector and an alternative solution to the high number of miners working outside of the designated “mining corridor” in *Madre de Dios*

## Laws and policy

- The General Law of Mining (1992)
- Law 27651—Law of Formalization and Promotion of Small-scale mining and Artisanal (2001)
- Law 28611—regarding the environment
- Emergency Decree no. 012-2010 (2010)

## Government institutions

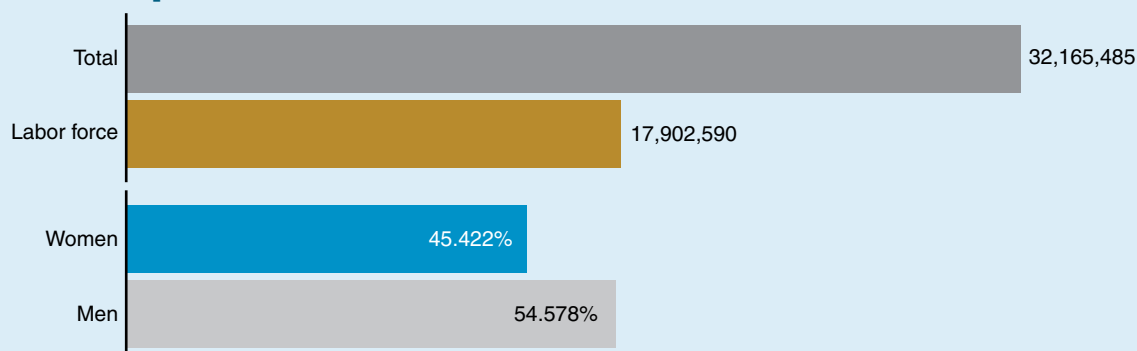
- Ministry of Energy and Mining (MOEM)
- Ministry of the Environment

## Associations and member organizations

- Federation of Artisanal Miners of *Madre de Dios* (FEDAMIN)
- National Federation of Artisanal Miners (FENAMARPE)
- Miners Producers of the Middle South and Center of Peru (AMASUC)
- Small-scale Mining National Association (SONAMIPE)
- Association of Women Ore Sorters of *Cuatro Horas*

# Economic and development data

## 2017 Population<sup>183</sup>



## 2017 Classification (GNI per capita)<sup>184</sup>

- Upper middle income: USD 5,970

## 2017 Gross Domestic Product<sup>185</sup>

- USD 211.389 Billion

## 2016 Poverty headcount ratio (2011 purchasing power parity)<sup>186</sup>

- Population on/below national poverty line: 20.7%
- Population living on <USD 1.90 per day: 3.5%
- Population living on <USD 5.50 per day: 24.3%

# Livelihoods

## Employment<sup>187</sup>

- ASM: 100,000 directly, 500,000 indirectly
- LSM: 174,000 direct employees, 1.5 million indirectly
- ASM informality estimate: >80% informal

## Gender participation in ASM

- Women: 15,000

<sup>183</sup>World Bank, 2017b.

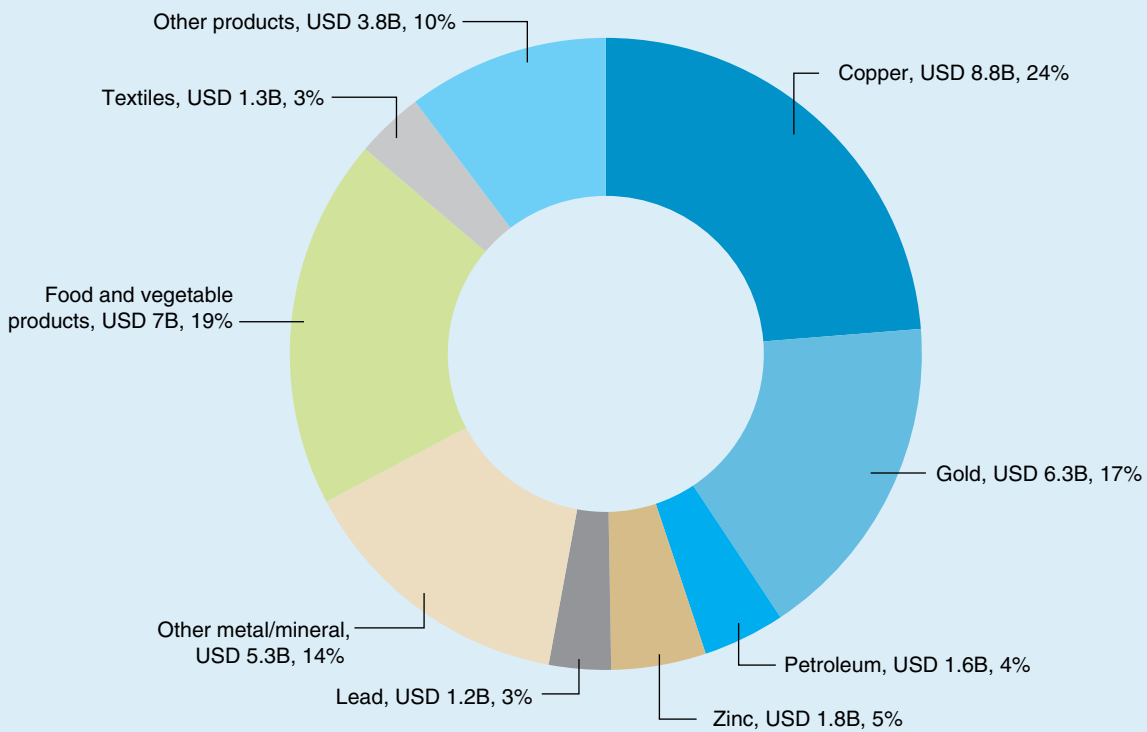
<sup>184</sup>Ibid.

<sup>185</sup>Ibid.

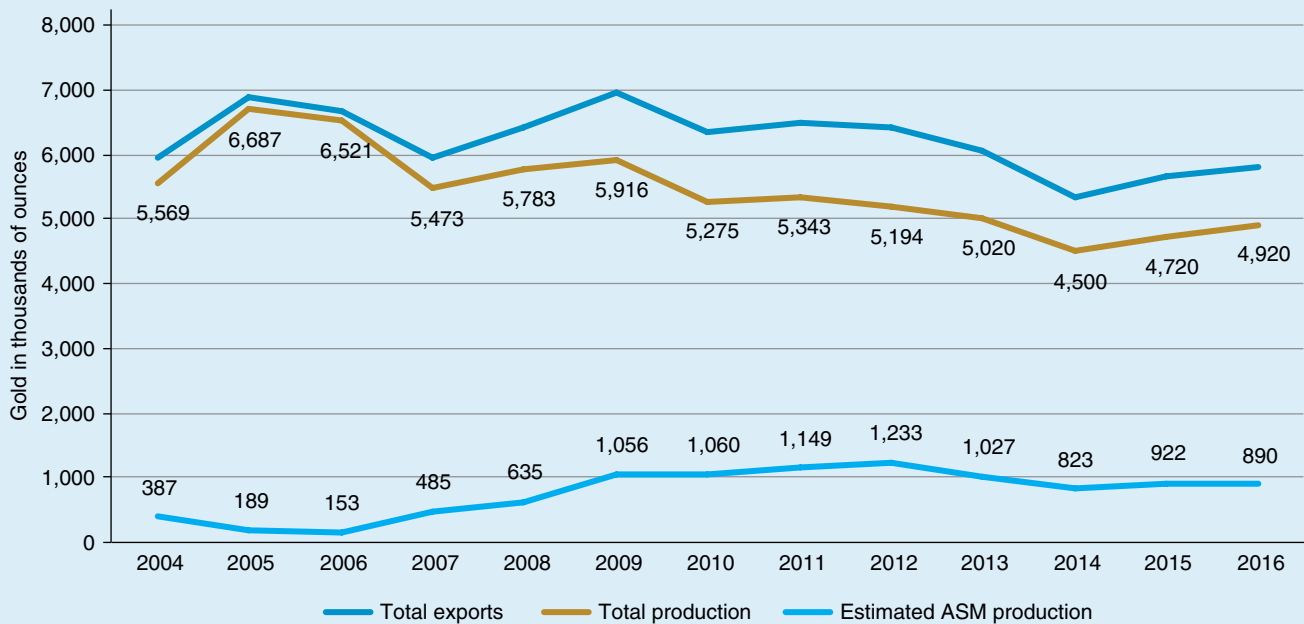
<sup>186</sup>Ibid.

<sup>187</sup>See Peru country profile text for discussion and data sources under heading “livelihoods.”

**FIGURE 6 EXPORTS FROM PERU IN 2016<sup>188</sup>**



**FIGURE 7 PERU GOLD PRODUCTION TOTAL VERSUS EXPORTS, AND ESTIMATED ASM PRODUCTION<sup>189</sup>**



<sup>188</sup>The Observatory of Economic Complexity, 2018b.

<sup>189</sup>Ministry of Energy and Mining, personal communication.

## **Mining sector summary**

Peru has a long mining tradition, with mineral revenues having been a major contributor to the country's development. However, while the country's vast mineral wealth is contributing to economic growth, the benefits are not evenly distributed and regional inequality is increasing. This has contributed to the growth of a large ASM sector.

ASM in Peru is mostly of gold, with small numbers of people extracting copper depending on international prices.<sup>190</sup> There is also some artisanal coal mining.<sup>191</sup> ASGM experienced a surge in the 1980s due to internal war and economic crises,<sup>192</sup> then again around 2007 due to an increase in international prices. While there are no LSM developments in the Amazon region, there are high levels of ASM activity. Unfortunately, due to the nature of those activities, ASM has become associated with deforestation of the rainforest and mercury contamination, as well as crime and violence. This has contributed to an incoherent policy toward ASM and difficulties in formalizing miners, particularly in the Madre de Dios region of the Amazon.

## **Mineral governance framework**

The Peruvian government is very supportive of LSM, promoting foreign investment through Legislative Decree No. 708. Most of the sector has now been privatized, and the marketing of all mineral products is unrestricted. This is even though LSM projects have created significant social unrest and numerous mining developments have had to be postponed as a result of high profile and sometimes violent community protests. Meanwhile, critics have argued that ASM is treated as a low priority and that policy toward the sector over time has been extremely inconsistent.<sup>193</sup>

ASGM operations were encouraged in the 1970s and 1980s, and the government granted concessions and established a national mining bank. However, the closure of the bank in 1991 during a period of economic liberalization meant the government lost its monopoly on gold purchases. Over the next decade or so, this along with the increasing price of gold contributed to an increase in ASM activity. In 2002, the ASM sector was officially recognized through Law 27651, which established an initial framework to regulate, formalize, and promote ASM and outlined conditions, obligations, and rights.<sup>194</sup> In 2006, this process was transferred to regional authorities, but unfortunately this was not accompanied with the necessary budgets, and regional personnel lacked the capacity for successful implementation. Other important laws during this period include:

- General Environmental Law (Law 28611) (2006), which established environmental guidelines applicable to all types of mining. The law made it necessary to apply for an environmental license for mining activity, which for ASM required submitting either a Declaration of the Environmental Impact or a semi-detailed Environmental Impact Assessment
- The Labor Organization Convention No. 169, which requires that indigenous and tribal people are consulted on issues that affect them, including all mining development

Due to increasing ASM activity, the associated strain on the environment, and the sector's links to violence and organized crime,<sup>195</sup> the government has become far less supportive of the sector in recent years. In 2010, the Ministry of the Environment pushed through Urgency Decree No. 012-2010, which suspended new mining petitions, established new mining exclusion zones, and prohibited the operation of dredges and similar machines in rivers. The decree resulted in police and military operations and was met with strike action on the part of the miners. More recently, the government has shown a renewed commitment

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<sup>190</sup>UNDP, 2012.

<sup>191</sup>International Council of Mining and Metals, 2018.

<sup>192</sup>UNDP, 2012.

<sup>193</sup>Low, 2012.

<sup>194</sup>UNEP, 2012.

<sup>195</sup>Sanborn et al., 2017.



to formalization, and data gathered from the MOEM during the author's fieldwork suggest that some progress is being made in the number of miners completing the process. However, these efforts have continued alongside violent interdictions and police action against miners,<sup>196</sup> even toward some who are engaged in formalization processes.

Inconsistent ASM policy has led to confusion among miners, particularly because the terms “artisanal,” “informal,” and “illegal” are used interchangeably.<sup>197</sup> The inconsistency is, in part, due to the internal government conflict that exists between the MOEM and the Ministry of the Environment, which both have very different approaches in dealing with ASM. In addition to these two main government ministries, other institutions closely linked to ASM include:

- Mining and Metallurgical Geology Institute (INGEMMET), which is responsible for granting titles for mining concessions and collecting license fees and penalty payments
- Organisation of Supervision and Environmental Assessment (OEFA), which supervises and imposes sanctions on concession holders who fail to comply with environmental regulations
- National Service for Environmental Certification of Sustainable Investments (SENACE), which approves Environment Impact Assessments

## **Economy**

Because Peru is one of the top 10 mineral rich countries in the world,<sup>198</sup> the country's economic development has long been associated with the export of minerals and precious metals. Currently, mining accounts for 24% of foreign direct investment.<sup>199</sup> In 2016, Peru's total GDP was valued at around USD 192 billion. Of this, USD 36.9 billion (19%) was made up of exports (Figure 6), 50% of which was from mineral revenues.<sup>200</sup> Thus, mining and oil production represented 14.36% of total GDP.<sup>201</sup> In 2016, copper was Peru's biggest export, representing 23.7% of all total exports by value and made up of USD 8.77 billion in ore and USD 1.38 billion in refined copper. Gold exports bring the government a further USD 6.25 billion, making up 16.9% of total exports, while zinc is the third biggest export at USD 1.22 billion.<sup>202</sup> An increased output of minerals, especially copper, contributed to a surge in exports in 2016, despite the falling global price of these commodities.<sup>203</sup>

LSM continues to be promoted by the national government, despite mining developments often leading to social unrest, while the economic contribution and benefits of ASM appear to be disregarded. This is certainly in part a result of the lack of good quality data on the total production of ASM. While EY Peru provides data for total gold production up until 2015, this is not disaggregated between large-, medium-, and small-scale mining, making it unclear if ASM production is included in national output. In 2012 it was estimated that the ASM sector produced around 20% of Peru's gold,<sup>204</sup> which is equivalent to a staggering USD 3 billion.<sup>205</sup> UNEP reports gold production from ASM in 2009 was around 1,178,150 ounces compared to just 592,602 ounces in the year 2000.<sup>206</sup> This represents an increased share in total gold production from 12% in 2000 to nearly 17% in 2009. However, the data are poorly referenced, and the original report the figures are based on does not appear to be available online. Data obtained from the government during the author's fieldwork in Peru shows UNDP's estimations of ASGM production based on the difference between official national production against gold exports (Figure 7). These figures suggest that in 2016,

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<sup>196</sup>Salo et al, 2016.

<sup>197</sup>Low, 2012.

<sup>198</sup>EY Peru, 2017.

<sup>199</sup>KPMG Global Mining Institute, 2016.

<sup>200</sup>The Observatory of Economic Complexity, 2018b.

<sup>201</sup>EY Peru, 2017.

<sup>202</sup>The Observatory of Economic Complexity, 2018b.

<sup>203</sup>EY Peru, 2017.

<sup>204</sup>Gardner, 2012.

<sup>205</sup>EY Peru, 2017.

<sup>206</sup>UNEP, 2012.

ASGM production was around 15.3% of gold production in Peru, compared to just 2.7% in 2005. However, this is slightly lower than the high of 2012, which the government estimates to be at around 19.2%, similar to the figure in the UNEP report.

However, much of the data supplied to the author by the MOEM is inconsistent with that provided in the UNEP report (Table 7). The UNEP report is in kilograms, but when converted to thousands of ounces, the estimates of ASGM production are far higher than the ministry’s estimates. The source that the UNEP cites for its figures is no longer available online. It is also unclear whether calculations have been made based on troy ounces (31.1 grams) or *avoirdupois*/regular ounces (28.35 grams).

**TABLE 7** Estimates of ASGM production, in thousand ounces, 2004-2009<sup>207</sup>

|  | 2004 | 2005 | 2006 | 2007  | 2008  | 2009  |
|--|------|------|------|-------|-------|-------|
| Ministry of Energy and Mining estimate | 387  | 189  | 153  | 485   | 635   | 1,056 |
| UNEP estimate                          | 818  | 949  | 956  | 1,023 | 1,023 | 1,178 |

## Livelihoods

As in other mineral-rich countries, informal gold mining livelihoods in Peru have the potential to provide a higher income than is available in other sectors.<sup>208</sup> ASM dominates national gold production in the Amazonian region of Madre de Dios, where gold deposits are too scattered to attract large-scale investment,<sup>209</sup> and high in the Andean mining town of La Rinconada, which at 16,700 feet above sea level is too inaccessible for large-scale companies. In Madre de Dios in particular, the environmental destruction linked to ASM livelihoods means that research often focuses on the impact of ASM activities on deforestation and mercury contamination, rather than the potential benefits the sector can have on poverty alleviation and local economies. However, some studies do attempt to compare the socioeconomic costs of alternative livelihood options, such as tourism and agriculture.

The data on the exact numbers of people involved in ASM are very imprecise and vary between publications. In 2010, around 300,000 people were estimated to be either directly or indirectly dependent on ASM.<sup>210</sup> This was revised in 2014 to include 100,000 people employed directly and a further 500,000 indirectly.<sup>211</sup> There is no data showing regional breakdowns. While several sources claim that there are more than 30,000 miners operating in Madre de Dios alone,<sup>212</sup> not only is it unclear where this figure comes from, but also whether it refers to miners operating within the designated mining corridor, outside of it, or both. This is important because 64% of mapped ASM activity in Madre de Dios occurs outside the active mining concessions of the mining corridor.<sup>213</sup> There is also surprisingly little clarity regarding the number of concession titleholders. While UNEP reported that by 2012, “many” small mining enterprises had either obtained ownership of mining claims or signed formal contracts with concession owners, more exact figures were not provided, and the report went on to acknowledge that the majority of artisanal and small-scale miners were still working on third-party concessions without contracts.<sup>214</sup> Data provided to the author by the MOEM suggest that the total number of ASM titleholders in Peru currently in the formalization process was 6,810. However, this does not necessarily reflect the total

<sup>207</sup>UNEP, 2012; Ministry of Energy and Mining, 2016.

<sup>208</sup>UNEP, 2012.

<sup>209</sup>Gonzalez, 2016.

<sup>210</sup>UNEP, 2012; Medina, 2010.

<sup>211</sup>Defensoria del Pueblo, 2014.

<sup>212</sup>Salo et al., 2016.

<sup>213</sup>Elmes et al., 2014.

<sup>214</sup>UNEP, 2012.

number of concession holders in Peru because additional titleholders may not currently be engaged in the formalization process.

The cost of formalization is prohibitively expensive for most miners, meaning that very few have even begun the process. Evidence puts costs at USD 130,000 per mining entity,<sup>215</sup> but official data are difficult to find. Data obtained by the author directly from the MOEM reported that as of July 2017, 1,004 people had completed formalization, but this figure was not disaggregated by region. A recent study showed that 5,500 miners in Madre de Dios had initiated the process of formalization, but only 11 had completed it.<sup>216</sup> More regional data are needed on the numbers of miners being formalized.

There is very little data on the livelihoods of women working directly or indirectly in ASM in Peru. Much of the research that does exist focuses on sex workers, particularly those who have been the victims of human trafficking. While some qualitative research explores the experiences of women who work as ore sorters near underground mines, the exact numbers involved are unknown, although it is estimated to be around 15,000 women nationally.<sup>217</sup>

Fair Trade is also an important aspect of ASM livelihoods in Peru, due to a movement based on theories of underdevelopment that stem from the experience of Latin America.<sup>218</sup> It is also here where Fairtrade International's original Fairmined and Fairtrade Gold Standards were implemented.<sup>219</sup> However, because only formal miners working either on their own concessions or on concessions contracted from the holders can gain accreditation, the schemes do not apply to many artisanal and small-scale miners.

## **Key data needs**

- There are no reliable estimates on the number of ASM operators, and the interchangeable definitions of legality, illegality, and informality mean that what data do exist are unclear
- More evidence is needed on the values of ASGM production over the last decade and of the contribution this makes to national output
- Reliable data that disaggregate formalization numbers by region is needed
- Far more data are needed on women in ASM in Peru, including the precise number involved and their earning potential relative to that of men
- Many documents are in Spanish and may need translating into English to make them more accessible to non-Spanish speakers. Similarly, many documents, reports, and handbooks on ASM globally are in English and may need translating into Spanish, especially to be of use to small-scale miners

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<sup>215</sup>The Global Initiative Against Transnational Organised Crime, 2017.

<sup>216</sup>Salo et al., 2016.

<sup>217</sup>Zevallos, 2013.

<sup>218</sup>Hilson and McQuilken, 2016, McQuilken, 2016.

<sup>219</sup>Maldar, 2011.



## Regional profile: Middle East and North Africa

Aside from Europe and Central Asia, which are not covered in this 2019 report, the Middle East and North Africa is the most understudied region, for where little to no data on ASM activities exist. This reflects the very limited ASM activities in these countries, where the clear majority of mining operations are mechanized and well financed. Even the quarrying and mining of development minerals, such as sand, gravels, and construction materials, are undertaken through medium- and large-scale industrial operations. Furthermore, due to the rich oil reserves in many of these countries, limited exploration, investment, and attention have been given to the mining sector and potential deposits.

A notable exception is Morocco. However, as the following country profile illustrates, even here only a handful of small-scale miners are said to be operational. Yet their contribution to the economy is significant, as is the need to update the mineral governance regime, therefore making it a worthy case for investigation. This Middle East and North Africa regional profile is therefore exceptionally short, with a brief overview of select countries to illustrate the wider context of the mining sector in this region of the world (Table 8).

**TABLE 8** Overview of mining activities in select countries in the Middle and East and North Africa region <sup>220</sup>

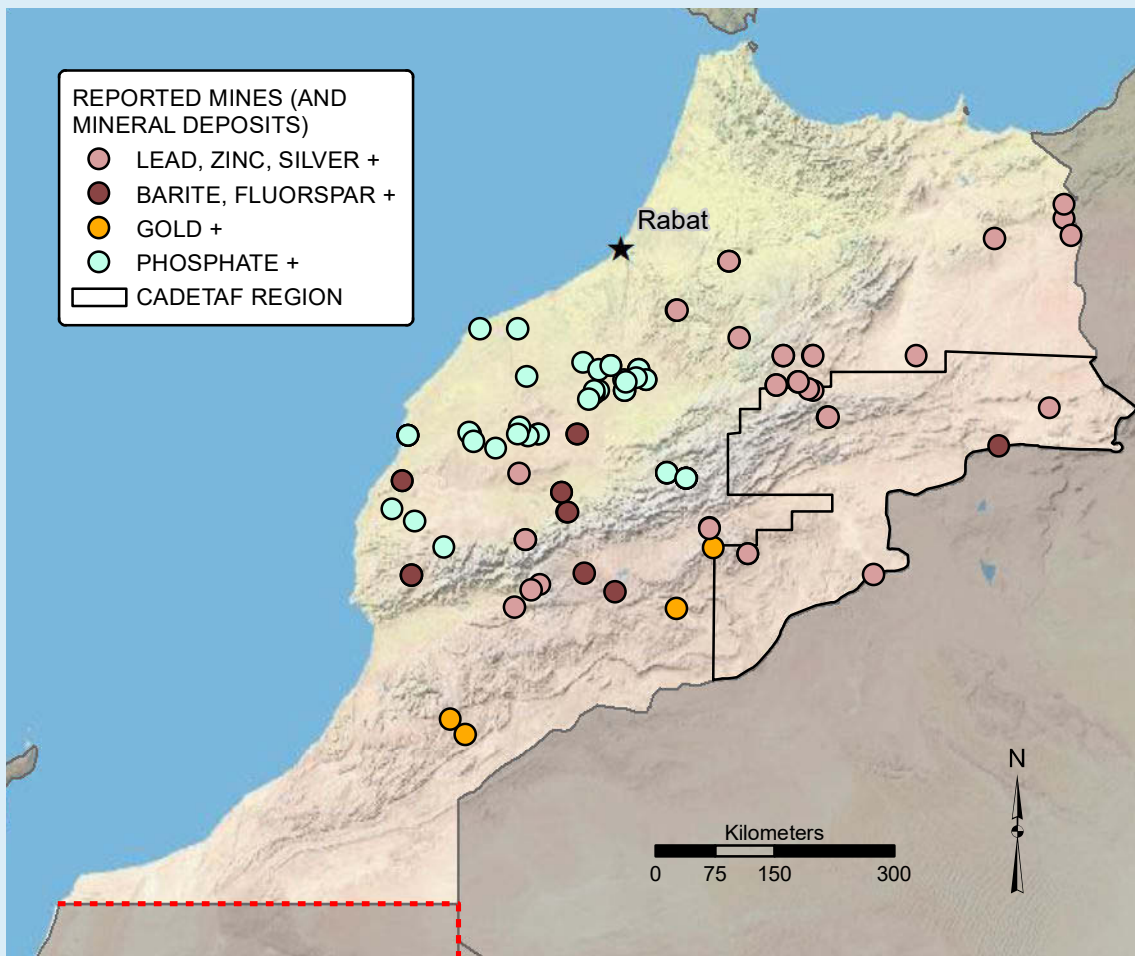
| Country | Details   |
|---------|---|
| Algeria | Highly prospective, particularly for base metals, iron, and gold. Non-oil sectors, including mining and metal industries have emerged as key drivers of growth in the last 10 years as the government actively pursues economic diversification by encouraging domestic and foreign investment in mining. Potential significant reserves of gold, phosphate, lead, and zinc. Additional prospects include diamonds, gems, (precious and semiprecious), and uranium.   |
| Egypt   | Substantial mineral resources, including iron ore, coal, phosphates, and tantalite. Commercial producer of gold and has more than 40 different mineral ores.  |
| Jordan  | Mineral resources in Jordan include phosphates, potash, and uranium. More than 60% of the area of Jordan has phosphate deposits at minable depths, and the country is the world's 6th largest phosphate rock producer holding 4% of global supply and is the second largest phosphate exporter in the world. The country is also one of the richest sources of potassium globally, producing 2 million tons of potash annually, as well as sodium chloride and bromine from the eastern side of the Dead Sea. |
| Libya   | Despite large deposits of iron ore (Wadi Ash Shatti, 795 Mt of ore at a grade of 52% iron) and manganese, as well as potential reserves of gold, uranium, gypsum, and phosphate, limited exploration has occurred due to focus on the oil sector and a lack of foreign investment.  |
| Oman    | Oman has a substantial mineral resource wealth base including significant deposits of chromite, dolomite, zinc, limestone, gypsum, silica, copper, gold, cobalt and iron, and marble.   |
| Tunisia | Tunisia's mineral resources are contained in the volcanic zones. Minerals to be exploited on a commercial scale include iron, phosphates, lead, and zinc.   |

<sup>220</sup>DLA Piper, 2012; Norton Rose Fulbright, 2018.

# Morocco

**Author: Rachel Perks**

## **Location of key mineral deposits and Zone CADETAF for ASM<sup>221</sup>**



## **Materials mined by ASM<sup>222</sup>**

- Barite, lead, zinc total: 495,710 tons (2013)
- Barite: 397,000 tons = 80% of total (2013)
- Total revenue to ASM in 2013: MAD 214 million = USD 22.68 million

<sup>221</sup>Map created by Daniel Stapper. Using Base map: US National Park Service, 2017; Mines and mineral deposits; USGS, 2018; MANAGEM, 2018; MEMSD, 2018c; CADETAF region: based on map provided by CADETAF and MEMSD.

<sup>222</sup>Data obtained from MEMSD and CADETAF during fieldwork visits to Morocco by Dr. Rachel Perks in 2014.

# Mineral governance framework

## Government priorities

- Liberalize commercialization and exploration of minerals in the CADETAF region
- Reduce artisanal zone to 6,000 km<sup>2</sup> and open 54,000 km<sup>2</sup> to prospecting and exploration
- Improve production techniques, working conditions, and mitigate environmental impacts

## Laws and policy

- 1951 Mining code regulating whole mining sector, updated in 2015 by *Dahir* no. 33-13
- *Dahir* no. 1-60-019 of 11 Jumada II (1960), established ASM region of *Tafialet* and *Figuig*
- *Dahir* no. 5 rejab 160-007 of 1380 (1960), established labor, safety, and training requirements of ASM

## Government institutions

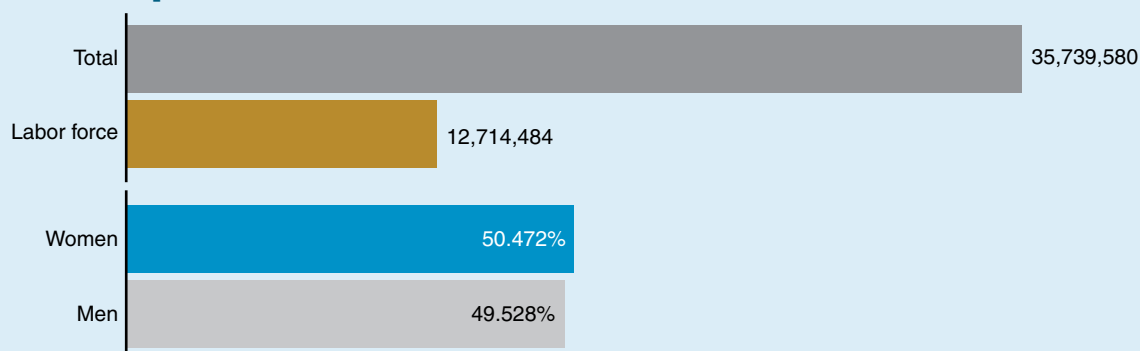
- Ministry of Energy, Mines, and Sustainable Development (MEMSD)
- *Centrale d'Achat et de Développement de la Région Minière du Tadialet et de Figuig* (CADETAF)
- *Djemmaa* (Council of Artisans) located in each mining area that administer mining rights

## Associations and member organizations

- None

# Economic and development

## 2017 Population<sup>223</sup>



## 2017 Classification (GNI per capita)<sup>224</sup>

- Lower middle income: USD 2,863

## 2017 Gross Domestic Product<sup>225</sup>

- USD 109.139 billion

## 2006/2007 poverty headcount ratio<sup>226</sup>

- Population on/below national poverty line: 8.9%
- Population living on <USD 1.90 per day: 3.1%
- Population living on <USD 5.50 per day: 16.2%

# Livelihoods

## Employment

- ASM: 5,000–10,000 (total),<sup>227</sup> 1,500 (barite)<sup>228</sup>
- LSM: 39,000 (total mining sector, 2014)<sup>229</sup>
- Licenses: 6,736 (total mining sector, 2014)<sup>230</sup>

## Gender participation in ASM

- Unknown

<sup>223</sup>World Bank, 2017b.

<sup>224</sup>Ibid.

<sup>225</sup>Ibid.

<sup>226</sup>World Bank, 2017.

<sup>227</sup>Ibid.

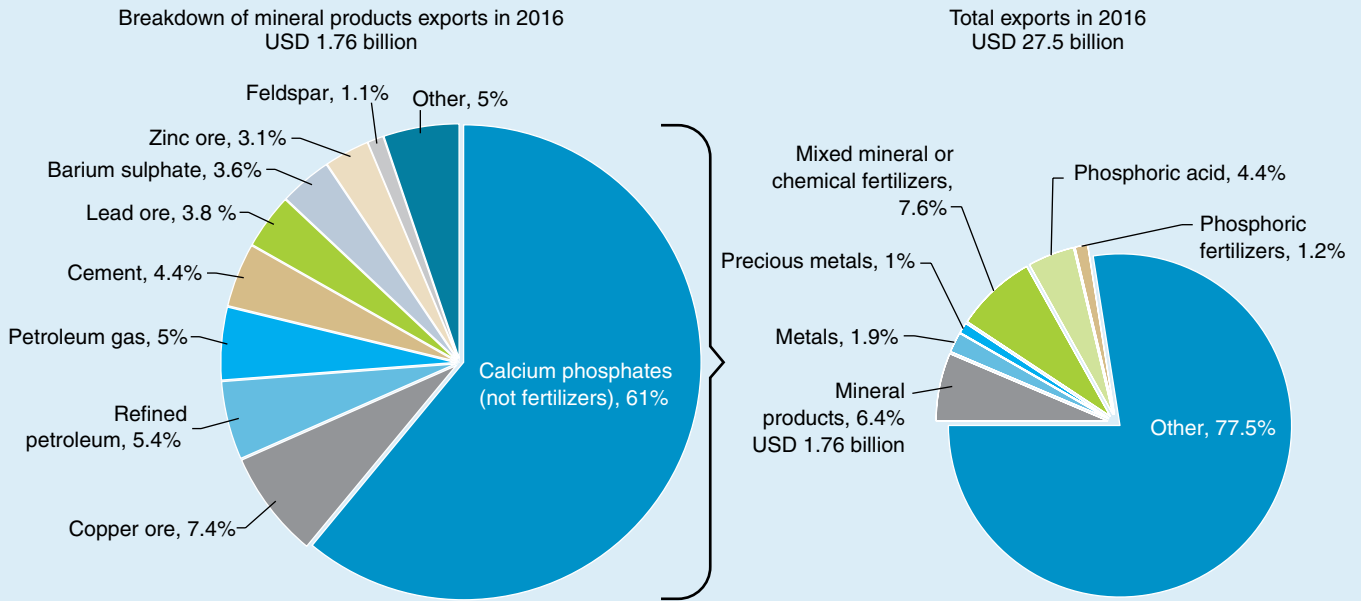
<sup>228</sup>ILO, 1999, p. 8.

<sup>229</sup>MEMSD, 2018a.

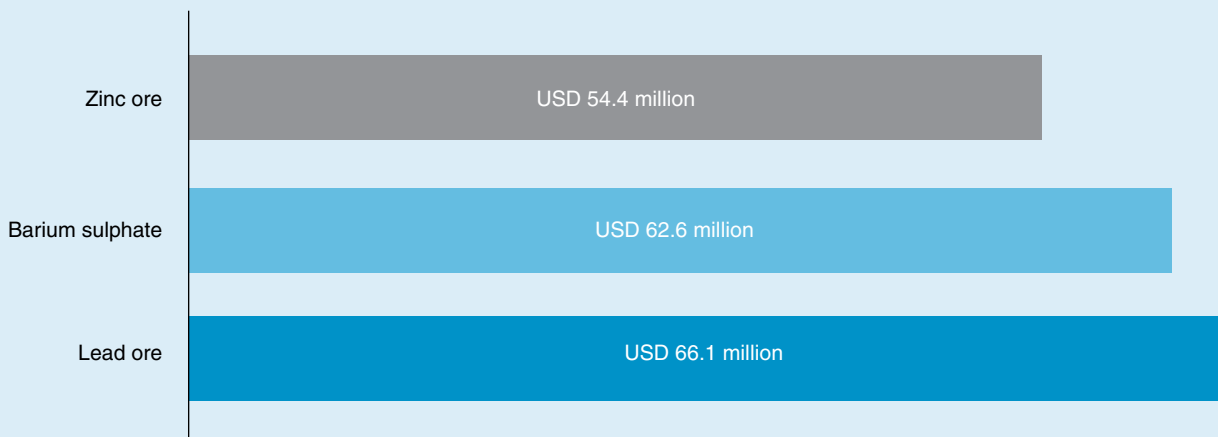
<sup>230</sup>Ibid.



**FIGURE 8 CONTRIBUTION TO TOTAL, AND BREAKDOWN OF, MINERAL PRODUCT EXPORTS FROM MOROCCO IN 2016<sup>231</sup>**



**FIGURE 9 EXPORT VALUE OF KEY MINERALS EXTRACTED BY ARTISANAL AND SMALL-SCALE MINERS IN MOROCCO IN 2016<sup>232</sup>**



<sup>231</sup>The Observatory of Economic Complexity, 2018c.

<sup>232</sup>The Observatory of Economic Complexity, 2018c. *Note:* These figures are for the total value of zinc, barite, and lead (the main minerals mined by ASM in Morocco) exported from the country in 2016. They are not disaggregated between ASM and LSM sources.

## Mining sector summary

Morocco's mining sector is best known for phosphate (Figure 8). The country consistently ranks within the top three global producers and exporters of all forms, and it is home to approximately 77% of known global phosphate reserves.<sup>233</sup> In 2014, the country produced 31.8 million tons, accounting for 94% of the 33.8 million tons produced globally in the same year.<sup>234</sup> Beyond phosphate, Morocco is also recognized for its global output shares of arsenic (16%), barite (10%), cobalt (2%), and fluorspar (1%). Of these, barite is the only mineral which has a considerable portion derived from artisanal and small-scale producers, estimated to account for 90% of the country's production.<sup>235</sup> Traditionally, ASM activities also exploit small amounts of lead ores and zinc, while more recently the southern part of the country has witnessed a growth in small-scale gold mining.<sup>236</sup> As Morocco embarks on a series of mining sector reforms and modernization on a scale not seen since the 1960s, the need for accurate, reliable, and quantifiable data on the country's ASM sector is more pressing than ever before.<sup>237</sup>

## Mineral governance framework

Since 1960, almost all ASM operations are found in the mining regions of Tafilalet and Figuig where they have been governed under a special mineral regime—the Zone *Centrale d'Achat et de Développement de la Région Minière du Tafilalet et de Figuig* (CADETAF—Central Purchasing and Development of the Tadialet and Figuig Mining Region). This ASM area is separate from the 1951 mining regulations which cover all exploration and exploitation of large-scale operations in the rest of the country. Designed in part to address the increase in informal ASM activities that had overtaken the area following the collapse of industrial mining operations in the 1950s, the decree of 1960 (*Dahir* no. 1-60-019) created the Zone CADETAF to formalize and manage operations. Considered suitable only for the small-scale exploitation of barite, lead, and zinc, the 60,000 km<sup>2</sup> zone, which borders Algeria and is largely covered in desert, is managed by the CADETAF public institution that was created at the same time. CADETAF reports to the Ministry of Energy, Mines, Water and Environment and is mandated to manage and provide technical support services to small-scale miners operating in the zone, conduct research and exploration, and help commercialize and develop production. CADETAF is also responsible for buying and transporting minerals produced by ASM operators in the zone via collection centers, and developing and maintaining the market for the ores being extracted.

In an effort to commercialize production and secure additional investment into the ASM sector, in 1982 CADETAF gave permission to three private organizations to buy and trade minerals on its behalf. However, in recent years CADETAF has continued to struggle with the financial capacity necessary to manage, support, and monitor ASM operations across the vast operational territory. The zone remains extremely underutilized, with only 7% estimated to be currently exploited by ASM operations. And, without any modern geoscientific exploration having been undertaken, the areas that are most suitable for ASM activities and the full economic and development potential of all deposits in the zone are unknown. The reasons for mine site inactivity are multiple, such as a lack of technical and financial capacity for ASM operators to develop deeper underground workings, after much of the near surface deposits have now been exploited, as well as lower commodity prices.

Since 2013, the government, as well as small-scale miners, have therefore been in discussion with regard to reforming CADETAF to open the zone up to investment and LSM. However, with the majority of artisanal miners working independently (as of 2013, only three cooperatives were registered), there is no common voice or representation at the national government level. The CADETAF reforms, first tabled as part of discussions around the wider revised national mining code that was adopted in 2015 (*Dahir* no. 33-13),

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<sup>233</sup>USGS, 2013; 2014; 2018; AMDC, 2019.

<sup>234</sup>MEMSD, 2018a.

<sup>235</sup>UNECA, 2018.

<sup>236</sup>Ibid.

<sup>237</sup>Unless referenced or stated otherwise, the majority of the data reported in this country profile were obtained directly from MEMD and CADETAF during fieldwork visits to Morocco by Dr. Rachel Perks in 2014.

envisage a diversified mining economy in the zone (e.g., not limited to barite, zinc, and lead) with various options for exploitation and partnership to secure investment. For example, one suggestion was to provide a ‘first right’ opportunity to small-scale miners so that they can retain their permits, while, at the same time, tendering opportunities for medium- to large-scale companies to explore and exploit other parts of the zone. Such ASM sector reforms may require, among others, the following activities:

- Updating the *Dahir* law of 1960 to allow more conventional commercialization and investment practices for small-scale miners, such as the ability to sell minerals to private buyers
- Modernizing mining rights to allow for both exploration and exploitation to occur simultaneously
- Reducing the size of the artisanal zone to 6,000 km<sup>2</sup> and opening 54,000 km<sup>2</sup> to prospecting and exploration by medium- and large-scale operators
- Redefining the role of CADETAF in supporting small-scale mineral development
- Implementing a benefit distribution scheme to allow for more tangible sharing of potential revenues that may come from more modernized, medium- to large-scale mining investments

All these interventions, some of which are already under way, would be greatly aided by contemporary and reliable data on the functioning of the ASM sector. This includes data on the location, size, organizational setup, and value chains of operations, geological information, and potential private sector investment and buying opportunities, as well as accurate production figures in order to understand the contribution of the sector to the country’s economy.

## **Economy**

According to the Ministry of Mines, 39,000 people are employed across Morocco’s mining economy, predominantly in the phosphate sector. Mining comprised 10% of Morocco’s GDP in 2014 and 22% of national exports (by value).<sup>238</sup> As outlined, the majority of GDP value is derived from phosphates, followed by arsenic and barite, with ASM accounting for almost all of the production of the latter. However, mining data on the amount of production and revenue generated in Morocco are not regularly disaggregated between large-scale and small-scale operations, making reliable estimates that quantify the economic contribution, size, and importance of ASM very challenging. Furthermore, the MEMSD website<sup>239</sup> has very limited production data which only cover the years 2010-2014 (inclusive) and provide no estimates for ASM.

The data that are available therefore originate from figures obtained by the author during fieldwork to Morocco in 2014, CADETAF, and related government institutions. These state that a combined total of 495,710 tons of barite, lead, and zinc, was produced in 2013 (Figure 9), generating revenues of approximately Morocco durhams (MAD) 214 million (USD 22.68 million) for small-scale miners. Of this, 397,000 tons were barite, accounting for 80%. This compares to the 1,094,5 (sic) tons of barite (i.e., likely 1,094,500 tons) quoted on the Ministry of Mines, Energy and Sustainable Development’s website as having been produced in the same year by the whole country’s mining sector. If accurate, this would mean that, in terms of tons produced, ASM barite production accounted for 36% in 2013. A figure that does not tally with the 90% quoted by United Economic Commission for Africa (UNECA).<sup>240</sup> Clearly, there is a very significant data gap here.

While the production of barite, lead ores, and zinc has grown significantly over the past 15 years, up from a reported 93,447 tons in 2004, it is the government’s intention to further increase the contribution of mining to GDP through the set of reforms already outlined, including allowing for other companies to invest in activities through private buying arrangements. In terms of the current buying arrangements and with regard to how small-scale miners extract value from their operations, CADETAF has multiple collecting centers equipped with weighing, analyses, and storage facilities. Here, small-scale miners are

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<sup>238</sup>MEMSD, 2018a.

<sup>239</sup>Ibid.

<sup>240</sup>UNECA, 2018.

paid based on a rate that is calculated by deducting the costs associated with transport and export (CIF value),<sup>241</sup> and the addition of the following margins as prescribed by the Minister of Mines: alquifou (lead ore), MAD 300 per ton; barite, MAD 10 per ton; lead ores, 15%; and zinc, 10%.<sup>242</sup>

## **Livelihoods**

Data on the number of people directly involved in ASM are, like the production figures, sparse. A similar but more general country profile commissioned by UNECA<sup>243</sup> estimates there are ‘around 5,000-10,000’ artisanal miners in Morocco, though no reference for this figure is provided. But, it is the same as that given in the ILO’s 1999 study.<sup>244</sup> The numbers obtained by this author during the 2014 fieldwork, however, provide a different estimate altogether. According to her field research, official records, and interviews with government officials, in 2014 there were an estimated 4,000 small-scale mining permits in the Zone CADETAF, of which 300-350 were active. In total, only 1,500 artisanal and small-scale miners and mine owners work surface and near-surface deposits in the CADETAF zone. Unlike the majority of other countries where ASM tends to fair favorably for job creation, in Morocco the ASM sector appears to support the livelihoods of considerably fewer people than LSM.

Though sparse in activity and production, the deposits of barite are rich (up to 85% ore grade), making ASM a viable full-time livelihood for individuals in the region. In the majority of cases, the workings have been passed down from father to son since the late 1950s. In terms of ownership, ASM is therefore dominated by male manager/licensees, while data related to female participation in the sector are completely unknown. Generally, operations range from artisanal workings of less than 20 persons to underground mines with over 300 workers, involving considerable mechanization and processing facilities on site. Some sites are barely visible to the eye while others can be seen atop the hills that line the perimeter of the Rose Desert.

In terms of labor, safety, and working conditions and improving incomes and value addition activities, there is a high need for introducing basic personal protective equipment and education in mining and processing, increased financing partnerships, and market collaborations for artisanal miners beyond CADETAF. As the Zone CADETAF is currently undergoing a transformation, careful planning is required in order to minimize any loss of livelihood or income, while also maximizing the benefits to existing ASM communities. In this process, some small-scale miners may choose to cease operations, while others may wish to continue exercising their historical mineral rights. The transition therefore presents the opportunity to provide alternative, less arduous livelihood options, while also implementing and supporting miners to meet international labor standards and best practice social, environmental, and health and safety requirements, and improve production techniques to increase efficiency and income earning potential.

## **Key data needs**

- Annual production data from the Zone CADETAF, disaggregated by mineral and more detail on functioning of activities
- Gender disaggregation of labor statistics
- Mine-to-market value chain data
- A mixed methods livelihoods survey to determine extent of labor force, disaggregated by job type, gender, and age, among others
- Geological data to map the location and quantify the value of mineral deposits in the Zone CADETAF

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<sup>241</sup>CIF (cost, insurance, freight) is a standard international shipping agreement used in the transportation of goods between buyer and seller. In CIF agreements, the insurance and transport costs are borne by the seller up until the goods are received by the buyer.

<sup>242</sup>MEMSD, 2018b.

<sup>243</sup>UNECA, 2018.

<sup>244</sup>ILO, 1999, p. 8.

## Regional profile: South Asia

South Asia is as mineral rich as it is culturally diverse. However, it is a section of the developing world where perhaps the least is known about ASM. The economic conditions and demographics of the region suggest that its ASM sector is populated by, and alleviates the hardships of, millions of poverty-stricken families: while South Asia is home to 22% of the world population, it only has about 1.3% of global income. As such, it is estimated that 60% of the world's poor are in South Asia.<sup>245</sup> As Table 3 shows, the region is considered to have a low human development, and 2.3% of the working age labor force can be estimated (conservatively) to derive a livelihood from direct engagement in the sector. This certainly has implications for ASM which is likely heavily poverty-driven and heavily tied to subsistence agriculture.

Analysis of ASM in South Asia is in short supply. In *Small-Scale Mining in the Developing Countries*<sup>246</sup> published in 1972 some—mostly descriptive—analyses of development mineral and gemstone deposits are provided for India, Sri-Lanka (Ceylon), and Afghanistan. Nearly two decades later, at the *Proceedings of the International Conference on Small-Scale Mining*,<sup>247</sup> considerably more focus was placed on ASM developments in South Asia; as the conference was held in Calcutta, it attracted delegates from surrounding countries. While most of the papers presented were conceptual, there were some significant contributions.<sup>248</sup> The MMSD project in the 2000s yielded only one ASM report on the region, a fairly comprehensive analysis of the situation in India.<sup>249</sup> This report shares data and official statistics collected by the government on production, employment, and number of operations.

Of all the countries in South Asia, it is India where ASM has been examined in the most detail. While quantitative data on licenses, plot sizes, and workforce dynamics remain elusive, several analyses<sup>250</sup> have emerged over the past two decades which offer insight on the context which drives ASM in the country, its gender dimension, and its cultural importance. These rich studies cover the full breadth of commodities being mined on an artisanal scale in India, including coal, diamonds, and gold. But, apart from sharing some detail about relevant mining laws, government websites fail to provide complementary quantitative information.

Because of its vast untapped mineral wealth, Afghanistan could become another major focus of ASM analysis in South Asia. It has in place an ASM policy,<sup>251</sup> and it appears to be only a matter of time, given mounting donor interest in its extractive industries as a driver for development, before support schemes for ASM emerge. Of particular interest in this context is the country's colored gemstones sector, which has been studied in considerable depth over the past three to four decades.<sup>252</sup> Afghanistan is particularly rich in emerald and ruby, which are mined in Parwan Province and Kabul Province, respectively, but which are being smuggled and rumored to be financing Taliban activity.<sup>253</sup>

In summary, the ASM data needs in South Asia are many. Given the region's widespread poverty, a better understanding of the role the sector plays in alleviating hardship and supporting rural families is imperative. With World Bank engagement in the extractive industries in several South Asian countries, including Bhutan and Afghanistan, increasing, there will be opportunities to gather baseline ASM data. But at present, data on small-scale mine licensees, production, pollution, and concession size are lacking across South Asia.

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<sup>245</sup>Kelly, 2018.

<sup>246</sup>UNDESA, 1972.

<sup>247</sup>Ghose, 1994b.

<sup>248</sup>These included two papers on India's geology which furthermore provided explanations for how geology influences decisions concerning ASM extraction; an analysis of the economic dimensions of small-scale mining in India; a brief on ASM in Afghanistan; and general pieces which explore the geology, policy environment, and production capacity of ASM in India, Bangladesh, Bhutan, and Nepal.

<sup>249</sup>Chakrovorty, 2001.

<sup>250</sup>Samal and Mishra, 1998; Lahiri-Dutt, 2004a, 2004b, 2016, 2917; Deb et al., 2018; Chowdhury and Lahiri-Dutt, 2016; Mukhopadhaya and Lahiri-Dutt, 2014; Lahiri-Dutt and Chowdhury, 2018.

<sup>251</sup>Islamic Republic of Afghanistan, n.d.; Lakhani and Corboz, 2017.

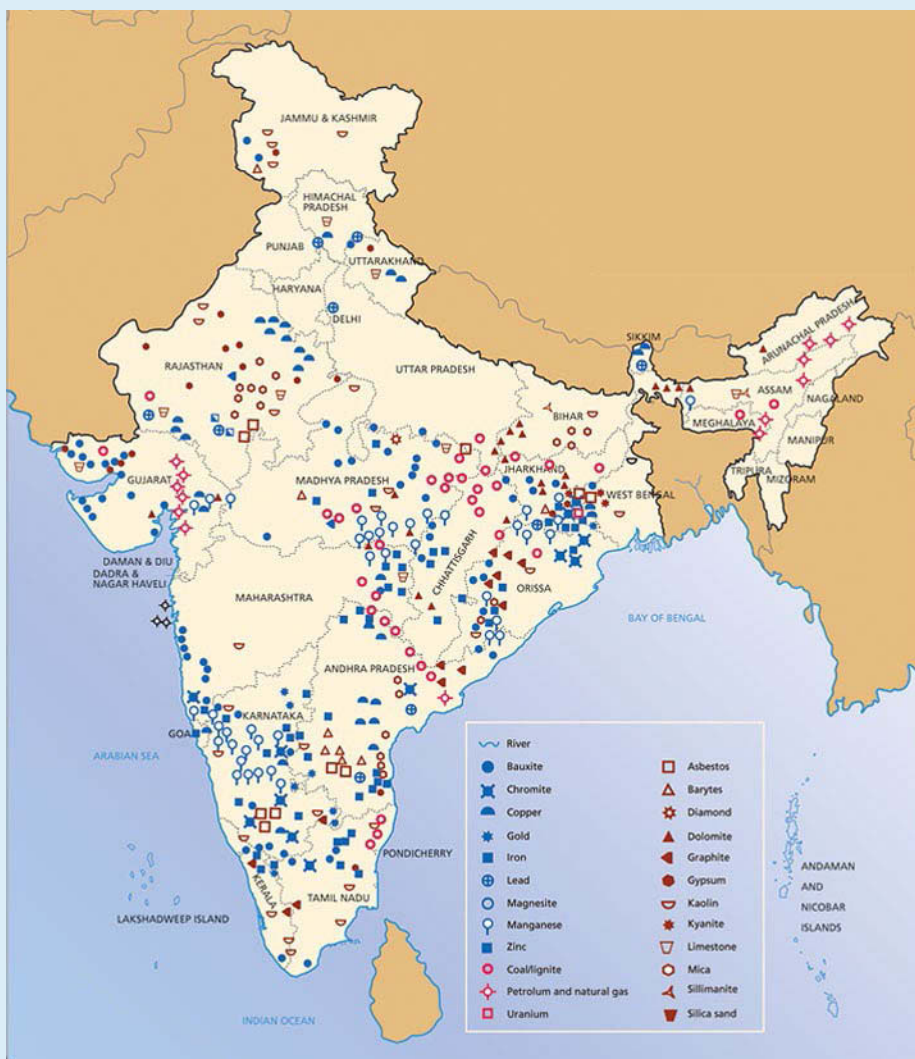
<sup>252</sup>Bowersox, 1985; Bowersox, 1996.

<sup>253</sup>Afghanistan Geological Survey, 2106.

# India

**Authors: Kuntala Lahiri-Dutt and James McQuilken**

***Metallic and nonmetallic deposits in India<sup>254</sup>***



## Materials mined by ASM

- Barite, bauxite, chromite, coal, copper, diamonds, gold, gemstones, granite, iron ore, limestone, manganese, marble, mica, sandstones, and slate

<sup>254</sup>Centre of Science and Environment, 2018.

# **Mineral governance framework**

## **Government priorities**

- Use satellite and remote sensing technology to map and monitor main ASM areas
- Development of an online National Mineral Information system for investors
- Actively closing ASM coal mining in the east, northeast, and iron ore in south
- Increase mining and quarrying contribution to GDP from 2–5%, much of which might come from ASM, but government favors large-scale and mechanized operations

## **Laws and policy**

- Indian Mines Act, 1952
- Mines and Minerals (Development and Regulation) Act, 1957 (amended 11 July 2016)
- Mineral conservation and development rule, 2017 (amended 27 March 2018)

## **Government institutions**

- Ministry of Mines
- Indian Bureau of Mines (IBM)
- Ministry of Coal
- National Institute of Miners' Health
- District Mineral Foundation (DMF)

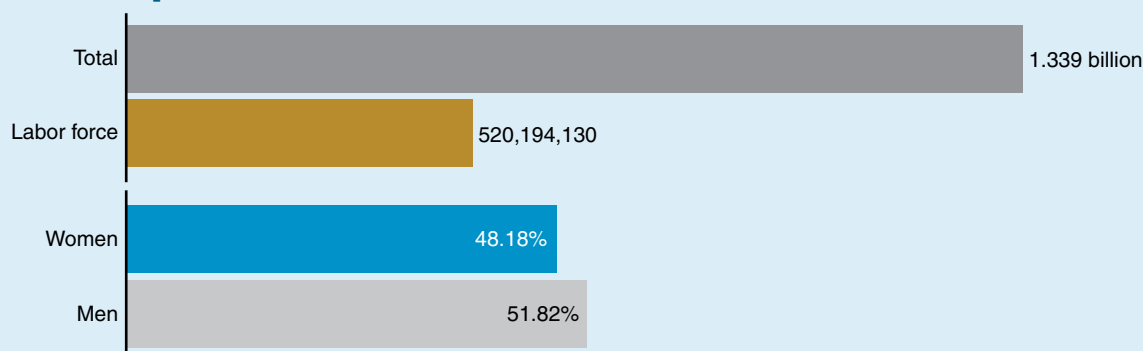
## **Associations and member organizations**

- None



# Economic and development data

## 2017 Population<sup>255</sup>



## 2017 Classification (GNI per capita)<sup>256</sup>

- Lower middle income: USD 1,820

## 2017 Gross Domestic Product<sup>257</sup>

- USD 2.597 trillion

## 2011 Poverty headcount ratio<sup>258</sup>

- Population on/below national poverty line: 21.9%
- Population living on <USD 1.90 per day: 21.2%
- Population living on <USD 5.50 per day: 86.8%

# Livelihoods

## Employment<sup>259</sup>

- ASM (not including quarrying of development minerals): >1–1.5 million directly, 3 million indirectly
- ASM (including quarrying): 12 million
- ASM informality estimate: 80% informal

## Gender participation in ASM

- Men: 60%
- Women: 10–40%

<sup>255</sup>World Bank, 2017b.

<sup>256</sup>Ibid.

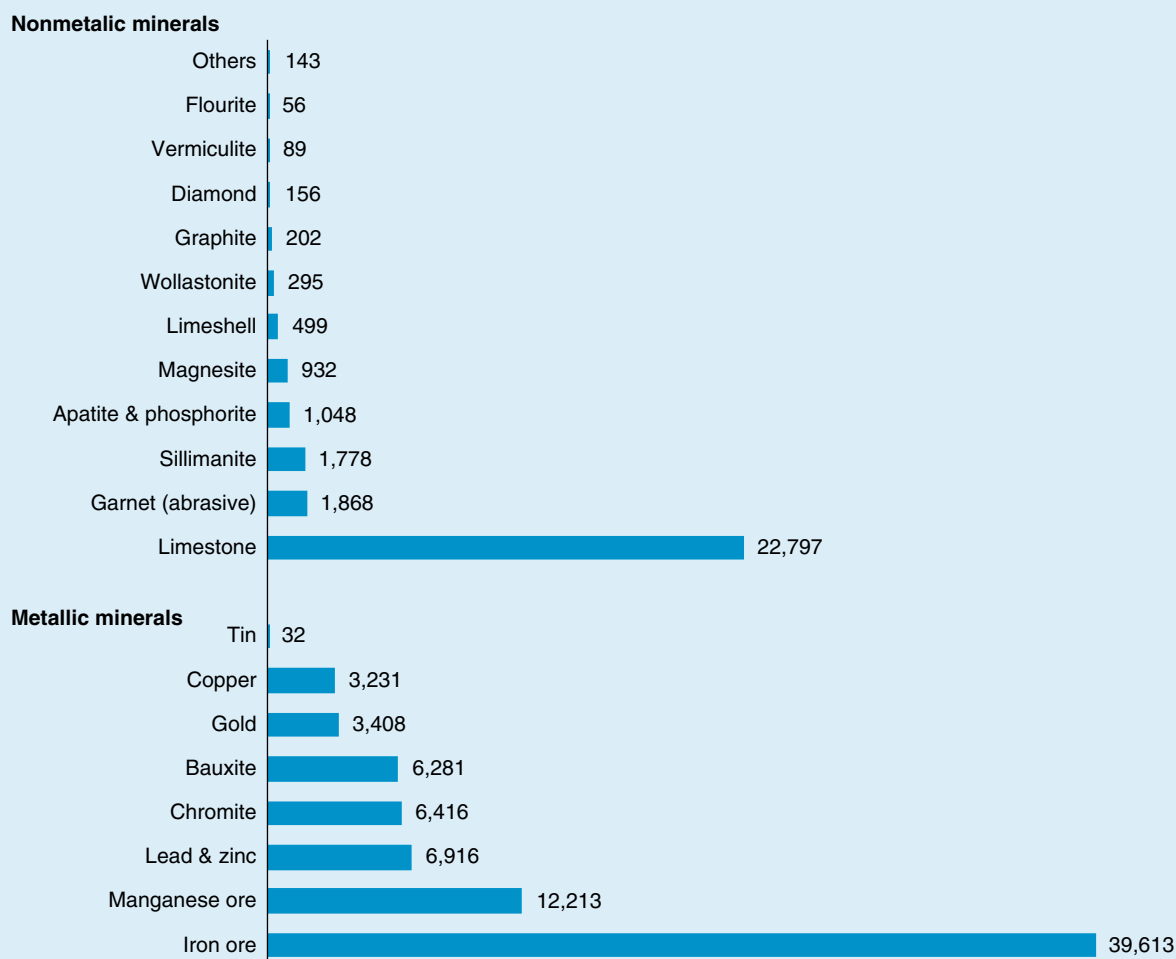
<sup>257</sup>Ibid.

<sup>258</sup>World Bank, 2011.

<sup>259</sup>See India country profile text for discussion and data sources.



**FIGURE 10 INDIAN AVERAGE DAILY EMPLOYMENT IN MINES DISAGGREGATED BY NONMETALLIC AND METALLIC MINERALS 2015–2016<sup>260</sup>**



**TABLE 9 EMPLOYMENT IN INDIAN MINES DISAGGREGATED BY LICENSE CATEGORY<sup>261</sup>**

| License type   | Number of mines | Average daily employment | Production value (INR crore) |
|--|-----------------|--------------------------|------------------------------|
| Category A = mechanized mines, >150 laborers, >75 laborers | 983             | 462,363                  | 221,645                      |
| Category B = other than A                                  | 1,071           | 26,331                   | 61,321                       |
| <b>Total</b>   | <b>2,054</b>    | <b>488,694</b>           | <b>282,966</b>               |

<sup>260</sup>Reproduced from data in IBM, 2015–2016, pp. 96–97. Note that certain key Development Minerals such as sand appear not to be captured.

<sup>261</sup>Reproduced exactly from IBM, 2015–2016, p. 98.

## **Mining sector summary**

With a long history of artisanal mining dating back to 400 B.C., India is one of the countries globally that has substantial ASM activity. The importance of ASM in India is in the variety and geographical spread of mineral and material availability, quality, and production, as well as the significant number of people, both women and men, laboring in the small-scale mines and quarries. Depending on the exact definition used, for example an absence of regular blasting and use of heavy earth moving equipment, and a labor force limited to 150 persons underground and 400 overall, it is suggested that over 95% of mines in India fall into the small-scale mining category. A wide range of minerals are mined in India (Figure 10). As many as 36 of the 64 different fuel, metallic, and nonmetallic industrial metals are mined exclusively by the small-scale sector and another 14 are mined partly by small-scale and partly by medium-scale operations.<sup>262</sup> Yet, data that disaggregate specifically and exactly between ASM and large-scale operations remain scarce, and the sector remains largely informal and poorly supported.

## **Mineral governance framework**

India's ASM sector has little recognition in the country's mineral governance framework. The Indian Bureau of Mines (IBM) classifies all minerals into two categories, 'major' and 'minor', and gives the responsibility of governing the 'minor minerals' to the concerned state governments. The central government tends to prioritize large-scale and mechanized mines. This apparent lack of interest in the sector from the central government is further evidenced by the lack of specific legislation covering activities. For example, while a distinction is made between 'artisanal' and 'small-scale' mining (SSM), with the later generally categorized as being undertaken with acquired mining rights under some statutory control, The National Mineral Policy of India mentions 'Small Deposits' (7.12) only once in passing: 'Efforts will be made to promote small-scale mining of small deposits in a scientific and efficient manner while safeguarding vital environmental and ecological imperatives.' Currently, the government is encouraging the formation of 'clusters' for these 'micro, small and medium enterprises' (MSMEs).

There is also no recognition of the history of artisanal gemstone or gold mining in India's laws, turning many potential licensees into illegal operators by default. The regulations that do exist for the India mining sector are also criticized for their complex procedural requirements, and for lacking certainty, clarity, and efficiency. The archaic Factory and Labour Laws are outdated, the Land Acquisition Act allows the takeover by the government of forested land owned by indigenous people, and the small size of mining properties present challenges to miners. Women are also discriminated against in law: The Mining Act of 1952 prevents women from working in mines underground and at night. As a result, women are not able to find better paying jobs in the larger, industrial mines, leading to the situation in which women's labor is concentrated in the ASM sector.<sup>263</sup>

As such, the majority of mining operations (80%) in India are informal; they are loosely regulated, poorly recorded, characterized by poor compliance to laws, and use inefficient and rudimentary technology. Principal issues affecting the mining industry are land availability, conflicts with existing land usage (such as forests), regulatory uncertainties, and production inefficiencies.

In terms of the governance of the sector and wider public perception, following the liberalization of the economy in 1993, much in contrast with the constitutional objectives, mining has come to be associated with scams, conflicts, violence, and ecological degradation.<sup>264</sup> Today, the mining industry's relationship with society is undeniably both critical and under pressure. Rising levels of public opposition and social conflicts are impacting operations in India.<sup>265</sup> For example, the National Green Tribunal (NGT) has played a key role in closing environmentally destructive mines in recent years, leading to the loss of jobs and unrest in north-eastern India; this is especially problematic because neither the NGT, nor NGOs on the whole,

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<sup>262</sup>Chakravorty, 2001; Tata Energy Research Institute, 2001.

<sup>263</sup>Chowdhury and Lahiri-Dutt 2016; Financial Chronicle, 2017; Jyotishi et al., 2018.

<sup>264</sup>Federation of Indian Chambers of Commerce & Industry, 2013.

<sup>265</sup>Centre of Science and Environment, 2008.

differentiate between ASM, quarries, and LSM. Generally, NGOs are against small-scale mining, and as a result many quarry owners have formed important power groups in mining areas.

In terms of representation of the small-scale miner's interests, in 2015 the Mines and Minerals (Development & Regulation) Amendment Act, mandated the creation of District Mineral Foundations (DMF) in mining districts. These are set up as a nonprofit body, to work for the interest and benefit of persons and areas affected by mining-related operations, and are funded through royalties from miners. But, in terms of their effectiveness as a mouthpiece for the sector, their operation, composition of representatives, and functions are governed by the relevant state government. Furthermore, while India's strong tradition of trade unions could help support worker's rights and improve labor conditions, due to the sector being largely confined to the informal economy, there are no significant independent unions or associations representing the rights and advocating on behalf of miners.

There are some active projects working to improve the livelihoods of the some of the poorest members of society engaged in ASM in the country. For example, the ILO's International Programme on the Elimination of Child Labour (IPEC) also operates in India with a strong focus on mines and quarries. There are also a number of NGOs (e.g., Mine Labour Protection Campaign, Santulan, Bandhua Mazdoor Mukti Morcha, and Prasar) that are active in either helping organize miners, demanding legal rights, and improving working conditions through programs, such as the formation of a tribal cooperative marble quarry, providing safety gear, acquisition of identification cards to migrant labor, education of quarry workers' children, and stopping bonded and child labor.

## **Economy**

Exact figures on the contribution of ASM to India's economy are challenging to determine. The Indian Bureau of Mines (IBM) provides a vast annual data set that is very detailed, including statistics, such as the levels of 'Afforestation in Metalliferous Mines' and 'Consumption of Explosives' disaggregated by the metal.<sup>266</sup> Yet, it fails to determine between large-scale and ASM production.

In terms of production and the contribution of ASM to India's economy, a range of figures are presented. One estimate suggests that operations produce 10% of the total value of mineral production in the country,<sup>267</sup> but the proportion could be much higher. Another is that small-scale mining contributes 6% of total mining in India.<sup>268</sup> Yet another opposing view is that mining contributes just 2% of India's GDP, and that its contribution has been declining.<sup>269</sup>

What is certain, however, is that mining, and thus ASM, remains a key economic sector in India both for domestic supply of metals, minerals, and materials for the world's second largest population, as well as for export. India is the largest producer and exporter of dimension stones, accounting for nearly 30% of world production. Of these stones, in order of production quantity, sandstone and granite are most important, closely followed by marble, flaggy limestone, and slate. There are an estimated 12,000 stone crushing units in India with an annual turnover of over USD 1 billion. In total, formal mining exports amounted to INR 170,946 crore (approximately USD 23.74 billion) in 2014-15. In terms of value, diamond accounted for 83% of the total mineral exports during 2015-16, followed by granite 5%, alumina 2%, and iron ore 1%.<sup>270</sup>

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<sup>266</sup>IBM, 2015-2016.

<sup>267</sup>Lahiri-Dutt, 2008.

<sup>268</sup>Mineral and Mining Industry in India, 2010.

<sup>269</sup>Federation of Indian Chambers of Commerce & Industry, 2013.

<sup>270</sup>IBM, 2015-2016.

## Livelihoods

Exact and recent figures are difficult to obtain. According to the outdated ILO estimate, which do not appear to include all forms of quarry workers, 1-1.1 million people directly are said to work in ASM.<sup>271</sup> Another publication, which is also now over a decade old, reports that over 1.5 people directly and 3 million indirectly are estimated to work in India's ASM sector.<sup>272</sup> However, given the lack of data on seasonal workers and the migrant laborers who circulate from one location to another, the number of people mining directly may be twice as high, at an estimated 3 million.<sup>273</sup> The stone crushing sector alone, which is predominantly informal, is estimated to provide direct employment to over 500,000 people.<sup>274</sup> Another estimate calculates there are 12 million quarry workers alone in India.<sup>275</sup> This is in addition to the 3 million small-scale miners that are estimated working other metals and minerals, bringing the possible total up to 15 million (taking the lowest figure).

Yet many of these figures are unreliable. Census data provide employment figures in the occupational category mining and quarrying, thus clubbing together both ASM and LSM. These data also provide information on 'Main' (full time) and 'Marginal' (casual, part-time, seasonal) workers. However, the division of ASM and LSM is not clear. As outlined, the IBM does not disaggregate production data between ASM and LSM. However, it does, as per Rule 42 of Mineral Conservation and Development Rules, 1988, collect data based on two types of mines: Category A is based on > 150 total laborers, > 75 working underground and Category B on "other than A." Thus, Category B figures can be small-scale operations, as well as a proportion of Category A. For metallic and nonmetallic minerals in 2015-2016, on page 93<sup>276</sup> it states there were a recorded 471 Category A mines employing 82,000 persons daily (Figure 10). Yet, on page 98 where the figures are tabulated, the table shows 983 mines employing 488,694 people—clearly there is an error in the report. The numbers on both pages tally for the 1,071 Category B mines, which are recorded to employ approximately 26,331 people. Given the total combined figures (2,054 mines, employing 488,694 people) it is assumed the Category A numbers on page 98 are correct (Table 9). Yet this oversight demonstrates the challenges with obtaining reliable data. The contribution of the mines to the total value of these nonmetallic minerals and metals in the same period, was 78% and 22%, respectively.

As elsewhere, the ASM sector in India is a reservoir helping to support the livelihoods of some of the poorest people. Using national survey data, Siddiqui and Lahiri-Dutt (2015) estimate that more than 42% of the approximately 1.4 million people from households engaged in mining and quarrying are considered to be marginal, or extremely vulnerable, without secure jobs, and living in extreme poverty (those defined as living on less than USD 1.90 per person per day). As with other artisanal sectors, such as carpet weaving and *bidi* (indigenous cigarettes) making in India, unacceptable forms of child labor and debt bondage are not uncommon in quarries.<sup>277</sup> This is a particular feature of ASM in the country due to rural economic stagnation, caste-based social structures that sometimes sanction such exploitation, and the existence of semifeudal social structures.

Overall, the work in ASM is risky and unsafe, with none or limited personal protective equipment used. In terms of the methods of extraction, due to the lower barriers of entry, costs, and technical expertise required, as well as the higher value of precious or rare metals such as gold and tin, minerals such as mica, gemstones, and diamonds, or fuel resources such as coal, these resources are often the focus of artisanal activities. Stones and marbles, on the other hand, are largely extracted by more formalized, industrial, and larger small-scale mining operations.

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<sup>271</sup>ILO, 1999, p. 8.

<sup>272</sup>Lahiri-Dutt, 2007; Deb et al., 2008.

<sup>273</sup>Lahiri-Dutt, 2007.

<sup>274</sup>Divya et al., 2012.

<sup>275</sup>Lahiri-Dutt, 2008—see section "Methodological Challenges of ASM Data."

<sup>276</sup>IBM, 2015-2016, pp. 93, 98.

<sup>277</sup>Gunasekaran, 2014.

Women face particular gender-based discrimination in ASM, both in law and social norms. Despite women comprising 10-40% of the ASM labor force, with their participation depending on the type of commodity mined, they are often confined to lower level and poorly paid roles. In general, women do not own mining leases in India. Other factors determining women's participation include production technology, size of the operation, and remoteness of the mine location.<sup>278</sup> As outlined, women are not legally allowed to work underground, but it is not uncommon to find women toiling in shallow underground quarries. There are very limited official data on the significant contribution and essential roles that women play in India's ASM sector. However, census data on occupational categories do provide some statistics regarding the number of women employed as both full-time and part-time workers in the mining and quarrying sector, as well as descriptors of their socioeconomic condition. In terms of specific commodities, stone quarrying employs the largest *number* of women, while artisanal salt extraction has the largest *proportion* of women involved.<sup>279</sup>

## **Key data needs**

Overall, little is being done by the government to improve the poor and exploitative labor conditions, and to address the root causes, that is, rural poverty and uncertainties of solely farm-based livelihoods. More detailed, disaggregated, accessible, and reliable data on ASM will be a first step toward improving the situation by drawing attention to the poverty, exploitation, and unsafe working conditions, and helping support the wider formalization, development, and improvement of ASM in India. Specifically, there is a need to produce, and make publicly available, the following data:

- Total numbers of full-time and part-time, seasonal and casual workers in the LSM and ASM sectors
- Accurate and reliable production figures for all commodities extracted by LSM and ASM sectors
- Variations in wage rates between women and men in both LSM and ASM sectors
- Mapping of the value chains of different mineral commodities, value added and the various actors involved
- Export figures (both the quantities and values) of ASM mineral commodities

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<sup>278</sup>Aich, 1996; Chakravorty, 2001; Lahiri-Dutt, 2007.

<sup>279</sup>Mukhopadhyay and Lahiri-Dutt, 2014.

# Improving Methodology: Lessons Learned to Date

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In the context of the global data gap, aggregating large volumes of diverse data sets from a variety of sources is beset with a range of methodological challenges. Based on the work to date to establish Delve and a review of existing data collection and analysis efforts, the following lessons and best practices for reporting ASM data are shared.

## The importance of context and methodology

The context and methodology used to derive estimates of ASM population sizes are key to assessing data accuracy, reliability, and applicability. To illustrate, an often-quoted number for India's ASM population is a staggering 12 million.<sup>280</sup> But, tracing this number back to the original source<sup>281</sup> and context reveals that this estimate is based solely on artisanal and small-scale quarrying. The author explains that the number was calculated by extrapolating the state of Tamil Nadu's estimated 750,000 quarry workers out of a total population of 62 million in 2001 to the whole of India:

Tamil Nadu Commissioners in 1995 noted there were 750,000 quarry workers in that state alone. As Tamil Nadu had a population of 62 million in 2001, this would lead to an estimated total of more than 12 million workers in the quarries for the whole of India using the same criteria of estimation derived from the West Bengal data.<sup>282</sup>

The reference to West Bengal needs further clarification. In the same paper, the author calculated a conservative estimate for India's total ASM population by extrapolating 100,000 quarry workers for the state of West Bengal, which at that time had a population of 80 million people, resulting in an estimate of 1.25 million.

Despite the author making clear that *“To this number needs to be added those working in other ASM, largely in illegal coal mines and gold panning,”*<sup>283</sup> the 12 million figure is often quoted as the employment figure for ASM in India without any reference to it only accounting for quarrying. Citing various figures, the author goes on to suggest that for illegal coal and gold mining, *“a total of 3 million people in the ASM sector would not be unreasonable.”*<sup>284</sup> This would bring the employment total for ASM (3 million) and quarrying (12 million) to 15 million people. Therefore, reporting the contextual qualitative information and caveats regarding how estimates are calculated is key.

## Impact of low and high estimates when aggregating data

What is the impact of using such different estimates? The vast majority of ASM employment estimates do not routinely include development minerals. But, given the size of the total estimate for India, using the lower figure of 3 million (assumed not to include quarrying)<sup>285</sup> has a significant impact on regional and global totals when aggregated (Table 10). Given the importance of development minerals, where possible Delve disaggregates ASM employment estimates to include quarrying, therefore the 12 million employment figure for India is included on the platform and in the regional and global totals.

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<sup>280</sup>Eftimie et al., 2012; Buxton, 2013.

<sup>281</sup>Lahiri-Dutt, 2006.

<sup>282</sup>Ibid., p. 6.

<sup>283</sup>Ibid.

<sup>284</sup>Ibid., p. 7.

<sup>285</sup>ILO, 1999, p. 8.

**TABLE 10** Example of how selecting lower and upper bounds of national ASM population estimates affect regional and global ASM population estimates<sup>286</sup>

| Country                        | National  |            | Regional  |            | Global     |            |
|--------------------------------|-----------|------------|-----------|------------|------------|------------|
|                                | Lower     | Upper      | Lower     | Upper      | Lower      | Upper      |
| China<br>East Asia and Pacific | 3,000,000 | 15,000,000 | 3,800,500 | 15,800,500 | 22,179,125 | 47,179,125 |
| India<br>South Asia            | 3,000,000 | 15,000,000 | 4,290,000 | 16,290,000 |            |            |

It is also worth considering the implications of having underestimated or overestimated ASM population and production data. Researchers tend to report higher figures and upper bounds of estimates and to leave out less impactful figures in order to demonstrate the significance of what has traditionally been a marginalized sector. But with a more accurate but potentially lower ASM data estimate for metrics, such as employment, the concern on the one hand is that efforts to drum up support for the sector could be undermined. On the other hand, the sector’s image could improve if artisanal and small-scale gold mining (ASGM) is shown to be a much smaller source of mercury pollution. Mitigating this requires ongoing qualitative analyses and description to accompany quantitative data sets and “make sense” of the wider development, governance, and political contexts that the data sit in.

## Comparability

Data comparability—the extent to which different data sets draw from different methods and analyses can be used together and compared—is a key challenge when aggregating data sets to compile countrywide, regional, and global totals. The way in which employment is defined and counted can create significant differences in estimates. For example, ASM employment estimates for China have ranged from 2.5-15.6 million people over the years (Table 11). Certain estimates are based on Township and Village Enterprises (TVEs) government officials use to categorize a diverse range of livelihood activities, from toy making to coal mining. TVEs also include mining activities with varying degrees of sophistication, production volumes, scale, and size, some of which likely would fall outside of what would usually be defined as artisanal and/or small-scale. Furthermore, the TVE figures do not “include small private mines, state owned mines or illegal mines, and the figure is unlikely to be particularly accurate.”<sup>287</sup> “The real wild card” is the development minerals industry because “It is hard to find a village without a prefabricated concrete, brick, lime or tile manufacturer, all of which use massive amounts of aggregate material, usually mined on a small scale locally.”<sup>288</sup> The lack of distinction between the three TVE categories of “mining industry,” “materials industry,” and “mineral processing” further complicates things. In addition, more recent official statistics appear to have replaced TVEs with “Industrial Enterprises above Designated Size,” which is determined by revenue.<sup>289</sup> This variety in how ASM operations are defined and characterized makes generating reliable employment and production estimates difficult, especially when comparing over time.

<sup>286</sup>Figures are taken from the Delve platform at the time of writing, are not definitive, and are shown here to illustrate the effect of using higher or lower estimates on total global numbers.

<sup>287</sup>Gunson and Jian, 2001, p. 7.

<sup>288</sup>Ibid., p. 7.

<sup>289</sup>China Statistical Yearbook, 2017 [In English]: “The scopes of industrial enterprises above designated size were: all State-owned industrial enterprises and the non-State-owned industrial enterprises with revenue from principal business over 5 million yuan from 1998 to 2006; all industrial enterprises with revenue from principal business over 5 million yuan from 2007 to 2010; and all industrial enterprises with revenue from principal business above 20 million yuan since 2011.”

**TABLE 11** Comparison of ASM employment figures for China

| Source                                  | Employment estimate  | How the figure is referenced in the text  |
|---|--|---|
| ILO, 1999, p. 7                         | 4.3 million  | "Sources: Various, including answers to questionnaire, ILO, technical journals, United Nations agencies, World Bank."   |
| ILO, no date, assumed circa. 2000, p. 1 | 2.5 million (coal mines)   | No references provided.   |
| Gunson and Jian, 2001, pp. 6–7          | 6 million  | 1999 China Statistical Yearbook<br>1999 TVE Yearbook reports<br>2000 China Statistical Yearbook   |
| Hentschel et al., 2002                  | 3–15 million   | "The following table provides estimates of the number of people working in the ASM sector in the MMSD research countries."  |
| Shen and Gunson, 2006                   | Collective ASM: 2.95 million<br>Other ASM: 1.30 million<br>Total: 4.24 million | China Mining Association. Draft report on the policy study of small-scale mines in China; 2003 [in Chinese]<br>Billiton. Minerals companion. Kent: Mining Journal Books Ltd; 1999.<br>Department of Foreign Affairs and International Trade (DFAIT). The mining industry in China, FaxLink no. 43115, Ottawa, 76; 2001. |
| Seccatore et al., 2014                  | 2.746 million (gold miners)  | List of sources are given, but none for China. Likely figure is from the original CASM website.   |
| IGF, 2017                               | 9 million (mean)   | Artisanal and Small-scale Mining Knowledge Sharing Archive, 2017  |

## Transparency

Transparency in how calculations, figures, and data are arrived at and referencing of the original source and its context are essential to make informed decisions about the data reliability. This is also illustrated by the regional divisions in Table 3. Except for Somalia and Sudan, the UNDP division "Arab States" matches the World Bank's classification of "Middle East and North Africa."<sup>290</sup> Instead, these two countries are included in the World Bank's sub-Saharan Africa region, which are also the divisions Delve uses. As such, the ability to accurately compare human development indicators versus ASM population and production by region is somewhat compromised. To highlight the complexity and diversity of the global data gap, the Delve platform takes a transparent approach to data reporting by presenting a range of estimates, accompanying methodology, and disaggregation where possible.

## Quantifying the multiplier effect

A compelling data point used to illustrate ASM's role in rural development is the 'multiplier effect.' It was first highlighted in the late 1980s by Noetstaller, who wrote that the *"importance of [ASM] lies in its strong linkages with the secondary and tertiary sectors of the economy, particularly in its role as a supplier of production inputs for a large number of other economic activities."*<sup>291</sup> Elaborating on what the author refers to as "value of multipliers," Noetstaller references the calculations in a study conducted five years earlier by the USBM.<sup>292</sup> The calculations were based on ASM activities in several key American states: 1.3-2 for mining and mineral processing, 3-5 for employment, and 2-3.5 for income. Since this time, several studies have examined the multiplier effect for large-scale operations and ideas around shared local value in host

<sup>290</sup>By some estimates, Sudan could have as many as 2 million artisanal and small-scale miners and, therefore, is a significant addition/retraction from regional analyses.

<sup>291</sup>Noetstaller, 1987, pp. 7–8.

<sup>292</sup>USBM, 1982.



communities,<sup>293</sup> as well as the economic contributions of ASM to communities in Rwanda, Central African Republic, Liberia, and Uganda.<sup>294</sup> But, while the multiplier effect is an accepted and highly important feature of ASM, its *quantification* remains largely based on the 1982 USBM report of small-scale mining activities in the U.S., thereby making it difficult to accurately apply it to various countries and regions around the world. Table 12 shows how the multiplier effect has remained largely unquantified and evolved in the literature.

**TABLE 12** Select quotes showing origin and evolution of the multiplier effect in the literature

| Source  | Multiplier effect quote  |
|---|--|
| Noetstaller, 1987, p. 7–8, referencing USBM, 1982 | "[V]alues of multipliers have been determined for a number of states in the USA that have an important small-scale mining segment (13/). There, output multipliers for mining and mineral processing range from 1.3–2, while employment and income multipliers reach values from 3–5 and 2–3.5 respectively."  |
| United Nations, 1996, p. 216                      | "[I]f it is assumed that there are on average four additional family members per worker, which is a conservative assumption, then over 30 million people depend on artisanal and small-scale mining for their livelihood."   |
| ILO, 1999, p. 9                                   | "With a global workforce of up to 13 million and rising, the number of people who depend on small-scale mining for their livelihood, bearing in mind extended families in many developing countries and a small multiplier effect, could be 80–100 million."   |
| Mwaipopo et al., 2004, p. 27                      | "National surveys such as the Household Budget Survey (HBS) and Labour Force Survey (LFS) have limited information on mining activities. The recently constructed HBS-based national Social Accounting Matrix (SAM), on which the multiplier effect of one sector on other sectors of the economy are estimated (Wobst, 2003), fails to capture the mining sector (and hence ASM). For the same reason, estimates on the contribution of ASM to national employment [in Tanzania] are quite subjective." |
| Fisher et al., 2009, p. 38                        | "Nevertheless, given the lack of knowledge of poverty dynamics in artisanal mining communities across sub-Saharan Africa we suggest the need for further research on the contribution to poverty reduction. This should include comparison across mineral types and localities, an examination of the multiplier effect of ASM on local economies, and a longitudinal analysis of change to mining populations' poverty."  |
| Hilson, 2011, p. 1,034                            | "Importantly, unlike farming and other artisanal activities, the sector also has a significant multiplier effect, which, as Kumar and Amaratunga (1994, p. 16) explain, 'has a positive impact in terms of regional development, establishment of small-scale local industry, entrepreneurial development, and employment.'"   |
| Buxton, 2013, n.p.                                | "There are 20–30 million artisanal and small-scale miners across the world (see Table 1 for a breakdown by country) and the sector supports three to five times more indirectly."  |
| Hilson and McQuilken, 2014, p. 105                | "There are an estimated six downstream jobs 'created' per individual employed directly in the sector, a list of occupations which includes service people, such as taxi drivers, cooks and clothing merchants; semi-skilled labourers, including machine operators and repairmen; and skilled and educated groups, notably bookkeepers, accountants and technicians."  |

## Best practices for reporting ASM data

The following best-practice list for reporting ASM data is suggested to overcome the methodological challenges presented by the global data gap:

- **Always reference original, primary data sources.** This enables the reader to locate the original data source and prevents data recycling. Sometimes it may not be possible to find the original source if it is embedded in a long trail of references and sub-references; if this is the case it should be clearly stated. This will also help to future characterize the extent of the data gap making it clear what areas need to be addressed.
- **The methodology and approach used should be clearly outlined.** Clear notes on methodologies should be described and supplemented with background evidence and/or data. Outlining methodologies

<sup>293</sup>Fleming and Measham, 2014; Chuhan-Pole et al., 2015; World Bank, 2015; Xing et al., 2017; Hilson, 2018.

<sup>294</sup>Barreto et al., 2018 use a multiplier value of 2.5 based on a similar figure also being used for studies in Central African Republic and Liberia (after Hinton and Levin, 2010), and Uganda (after Hinton, 2009).

enables replication and repetition of studies by others, helping to promote improved methodologies, collaboration, and data sharing, as well as for scrutiny of results and findings.

- **Authors should state their confidence in estimates and any limitations.** By stating the limitations and extent to which the findings of a study are generalizable to other contexts, it helps ensure that data are used appropriately to inform evidence-based decision making.
- **Benchmarking and triangulation should be used to compare estimates and assess reliability.** This is a simple sense-checking exercise to determine whether the data and findings could be considered reliable and accurate. It is an easy and quick way to spot any inaccuracies or inconsistencies.
- **Quantitative data should be accompanied by qualitative analysis.** It is only through accompanying qualitative information and in-depth socioeconomic and political analysis that quantitative data can be made sense of and contextualized to support the development of more effective formalization strategies and policies.

# Conclusion: The shortlist of data needs

This inaugural report has shown the origins, impact, and extent of the vast ASM data gap that has hindered the socioeconomic development and formalization of the sector for over four decades. It has also clearly made the case for new baseline studies to collect detailed information about the people involved in ASM and the organizational structures they are a part of. The key to addressing the global data gap is through collaboration and contributions from all stakeholders across the ASM space.

## What data are needed?

What types of data are needed to ensure ASM can contribute to fulfilling the SDGs and national development priorities? It is clear from the discussion that the data need to vary to some extent by region, and significantly from country to country. However, there are still some very clear crosscutting needs and gaps that, if addressed, could generate access to complete, accurate, and reliable data sets on ASM at the global level (Table 13). This information is required to demonstrate the significant economic and social importance of ASM and its future potential as a fully formalized sector to national development. With a robust, evidence-based prioritization, formalization could be more effective. It also allows for the possibility to track progress and contributions of ASM to the attainment of the SDGs.

**TABLE 13** Key data needs identified by Delve for the ASM sector

| Data point                                | Description   |
|---|---|
| Data features                             |   |
| Accuracy and reliability                  | Data that are accurate and from reliable sources and accompanied by clear explanation of the methodological approach.   |
| Comparability                             | Data sets that are comparable and reconcilable by mineral, volumes produced, and across time, different data sets, countries, and regions.  |
| Detail                                    | Disaggregated by characteristics such as gender, age, education, ethnicity, job type, income, duration, and formality, and inclusive of a common set of metrics.  |
| Data types                                |   |
| Contextual and qualitative                | In-depth qualitative analysis and contextual description to accompany quantitative data sets are needed to “make sense” of the wider development, governance, and sociopolitical contexts that quantitative data sets sit within.   |
| Development minerals                      | Data that encompass the full range of minerals and materials exploited through ASM and quarrying.   |
| Employment                                | The true number and location of artisanal and small-scale miners operating (at a minimum) by country and region.  |
| Gender                                    | Detailed information of the participation and role of women in ASM and the gender-related challenges they face.   |
| Production                                | Production disaggregated by LSM and ASM activities, and commodities, especially development minerals.   |
| Revenue                                   | The fiscal contribution of ASM to government revenues, exports, and national and global economies.  |
| Data analysis                             |   |
| Geo data                                  | Easily accessible geological data that quantifies the location and value of deposits for ASM activities and zones to enable small-scale operators to access formal channels of finance.<br>Geo-data and geographical information system platforms that enable the development of maps to show the location and details of ASM activities. |
| System, network, and supply chain mapping | Mapping to understand the full extent of ASM, its communities, governance, organization, supply chains, and production networks from mining to international markets.   |
| Quantification                            | Statistical modelling and quantification of the social and economic contributions and multiplier effects of ASM to inform evidence-based policy making and spur formalization efforts.  |

(continues)

**TABLE 13** Continued

| Data point    | Description   |
|---------------|---|
| Collaboration |   |
| Accessible    | Data and information that are translated into a range of languages. Data in its raw form, as well as data visualizations, graphics, and statistics that are easy to use, interpret, and understand. |
| Data sharing  | Data that are publicly available and easily accessible for all, including small-scale miners. Sharing of data collection and collaboration on research projects.                                    |

## How can the global data gap be narrowed?

A range of suggestions to improve data availability and access have emerged from the various consultations held under the Delve initiative since 2017. First is to improve sharing of qualitative and quantitative data that are currently collected, whether as research for donor-funded projects, due diligence exercises for companies, or traceability schemes for industry and the global good. Second, going forward, is to combine data collection efforts between researchers, for example when undertaking field visits a geologist could administer a short livelihoods survey on behalf of a social scientist, and in return, the latter could collect soil samples when researching.<sup>295</sup> Similarly, if any organization is undertaking a new baseline or research survey, they could see if others would want to join forces and develop a common survey instrument.<sup>296</sup> Another idea is for the ASM community to agree on a minimum number of data points that should be collected during any ASM research or development project and to be shared on a platform like Delve.<sup>297</sup> Furthermore, vast amounts of geological and livelihood data are often generated by LSM companies coming into contact with local ASM communities that could be useful to researchers, government, and development partners looking to support the formalization of the sector. By coming together as an ASM community and with limited additional effort, there is great potential to significantly reduce the global data gap, and ultimately to support ASM to fulfill its potential role in the SDGs.

<sup>295</sup>This insightful suggestion was made by Peter Chirico, Associate Director of the USGS's Geology and Paleoclimate Science Centre during the Delve session at ASM18.

<sup>296</sup>For example the World Bank, USAID, and Tetra Tech are collaborating together to share resources and survey tools for new research being undertaken in the Central African Republic as part of their separate ASM projects.

<sup>297</sup>Prof. Gavin Hilson has initiated this, starting with a recent project in Ghana with the intention of extending it into Mali. The survey instrument was shared at ASM18 and will be used by the World Bank in the Central African Republic in 2019.

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## How to get involved in Delve

- Looking to share your work with a global audience and add to the global body of knowledge on the ASM sector? Become a data sharing partner of the Delve initiative.
- Get a chance to see the platform before it goes live! Participate in user testing and give us feedback to refine the design and functionality of the platform.
- Find us at an upcoming industry event to receive a platform demo and learn more about the vision for the platform and how to get involved.
- Do you represent a private sector organization interested in artisanal and small-scale mining? Join the private sector working group to help assess the utility of a private sector facing the fee-based component to the Delve platform.
- Support the platform through financial or in-kind sponsorship.
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