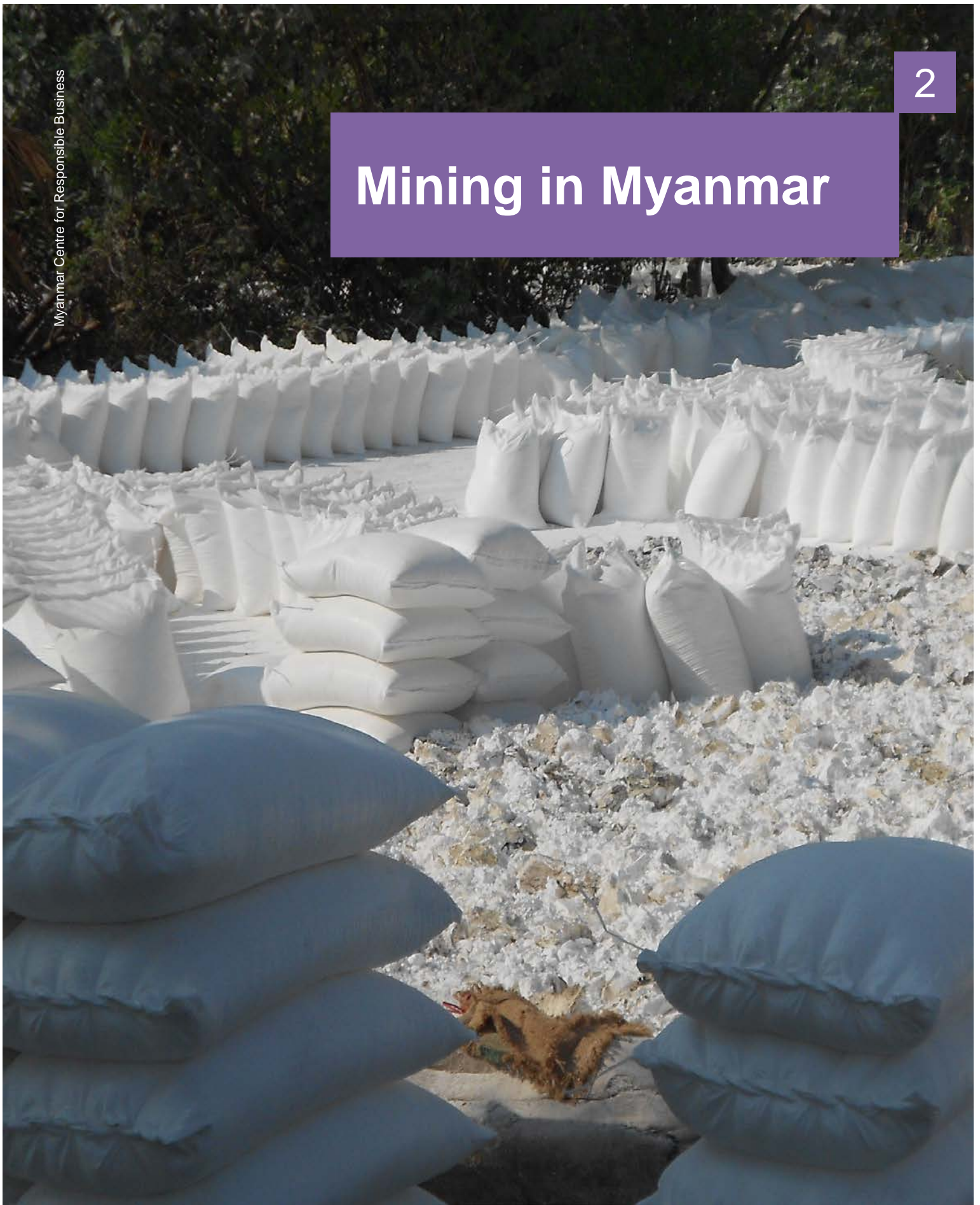


# Mining in Myanmar



## Part 2

# Mining in Myanmar

### In this section:

- A. Myanmar's Mineral Geology
- B. The Mining Sector's Significance in the Economy
- C. Business Actors
- D. Overview of the Limestone, Gold and Tin Sectors
- E. Subsistence/Artisanal and Small-scale Mining (ASM)
- F. The Mining Value Chain

## A. Myanmar's Mineral Geology

Myanmar's territory contains extensive mineral wealth, with deposits present throughout the country. Proven reserves span industrial minerals and stones, heavy metals, jade and gem stones, and energy sources such as coal.<sup>28</sup> As measured by reserves, Myanmar hosts at least three mineral deposits of global significance: the Bawdwin lead-zinc-silver deposits; the Monywa copper deposits; and the Mawchi tin and tungsten mine.<sup>29</sup> In 2014, Myanmar produced 10% of the world's mined tin supply (as opposed to scrap tin), emerging as the world's third largest producer as production increased by 4900% from 2009 volumes.<sup>30</sup>

There is some recent history of mineral exploration in Myanmar but the country's overall geology and mineral reserves remain poorly understood. Available geological data is limited (the latest geological survey took place in 2008) but publicised survey findings have indicated deposits of silver, lead, tin, tungsten and antimony to be widely spread across the country's territory, while gold, manganese, copper and coal reserves were all deemed to be substantive.<sup>31</sup> Geological maps and data are not generally obtainable for those states or regions over which the Union-level Government does not hold full control.

There are significant gold, jade, gems and tin deposits in Kachin, Shan and Karen States, all of which remain under partial control of EAOs. There are also significant gold deposits in Mandalay Region and Sagaing Region. Sagaing Region, which is home to the largest number of small-scale mining operations in the country, also holds large copper, coal, gold, tungsten and scheelite deposits. Officially, gold ore is restricted under Section 83A of the Foreign Exchange Management Law and also the restricted exports list of the Ministry of Commerce, although exports were permitted in January 2018.<sup>32</sup> Gold is therefore – alongside iron, steel, limestone and industrial minerals and barites – produced primarily for domestic consumption.<sup>33</sup>

<sup>28</sup> Oxford Business Group, [Myanmar's holds a diverse mix of mineral resources](#), 2016

<sup>29</sup> Gardiner et al, *ibid*, pp. 219-233

<sup>30</sup> Gardiner et al *ibid*, p. 220

<sup>31</sup> Stratfor, Myanmar: [A Risky Mineral extraction Market](#), *Stratfor Global Intelligence*, 24 October 2013

<sup>32</sup> Myanmar Times, [Gold exports now permitted in Myanmar](#), 24 January 2018

<sup>33</sup> MCRB interviews, 2016

Limestone deposits are present throughout several states and regions, with a deposit of especially high quality running from the north to the south of Kayin State in a broad and continuous band.<sup>34</sup> Mandalay Region holds important reserves of rubies, sapphires, iron and barite. Shan State also has significant ruby and sapphire mines.<sup>35</sup>

There are valuable tin, tungsten, scheelite and alluvial diamonds in Tanintharyi Region. A tin belt runs from the east of Yangon southwards along the Myeik Archipelago passing through Dawei where tin production has been concentrated and more than one hundred primary tin deposits have been identified. Other significant tin occurrences include the Mawchi Mine in Kayah State, once one of the largest global producers of tungsten and tin, and deposits within the Shan State in the Wa Self-Administered Region.<sup>36</sup> Rakhine State is a source of sandstone.<sup>37</sup>

## B. The Mining Sector's Significance in the Economy

Myanmar's mining sector remains underdeveloped, characterised by small-scale operations. The Myanmar Government cannot provide a value for current national reserves. There is a lack of skills and technology needed for concentration and beneficiation. One constraint for large-scale, professionalised mining operations is lack of reliable energy sources and poor infrastructure. For international investors, other barriers to entry have included past economic sanctions as well as numerous sources of political risk, such as weak regulation and enforcement capacity, risk of complicity in human rights violations related to land and security of the person, political uncertainty and persistent armed conflict. To date, these factors, and high costs and unattractive economic terms, have resulted in little formal foreign investment in the sector. Indeed foreign interest is waning. Two Australian companies who had sought prospecting/exploration licences have announced their withdrawal from Myanmar.<sup>38</sup>

According to Myanmar's first EITI report, extractives contribute 6% to GDP, 24% of government revenues and 38% of exports. However, the mining sector represents only 15% of total government extractives revenues. Of this 15%, jade and gems producers account for 88% of the mining revenue stream (see Table 5: Myanmar Extractives Revenue). The competitiveness of the Myanmar mining sector lags behind other countries due to lack of capital, poor quality equipment, low skills, and weak institutional support. For example, new exploration is disincentivised by the current lack of an accessible mining cadaster. Creation of an electronic mining cadaster is part of Myanmar's action plan and required by the EITI Standard under the MEITI process, supported by the World Bank.<sup>39</sup>

Figures from the Myanmar Investment Commission (MIC) show that mining accounted for around 4% of FDI between 2010-2011 and 2016-2017, but less than 1% in the years after

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<sup>34</sup> International Cement Review, *The Global Cement Report*, Sixth Edition, 2005, p. 215

<sup>35</sup> Dr James Shigley, [Historical Reading: Ruby Mines of Burma](#), Geological Institute of America

<sup>36</sup> Gardiner et al, *ibid*, pp. 219-233

<sup>37</sup> Tin T. Naing et al, [Provenance study on Eocene–Miocene sandstones of the Rakhine Coastal Belt, Indo-Burman Ranges of Myanmar: geodynamic implications](#) (2014) 386:1 *Geological Society, London, Special Publications* pp. 195-216

<sup>38</sup> Frontier Magazine, [Australian mining company to back out of Myanmar Investment](#), 17 March 2017

<sup>39</sup> EITI, [The EITI Standard 2016](#), February 2016

2010-2011 when a large investment was made in Letpadaung copper mine. Monthly MIC figures for 'citizen' (i.e. Myanmar-owned) investment in 2017 show mining also accounting for around 1% only.<sup>40</sup> However, these figures should be treated with caution as they represent only commitments to invest, and not actual investment, but do not include local investments which did not seek MIC approval.

**Table 1: Mining Licences issued by State and Type as of 31 January 2018<sup>41</sup>**

(Figures in brackets show the 31 March 2017 figure)

State or Region	Large-Scale	Small-Scale	Exploration	Feasibility	Subsistence	Small-Scale Processing	Total
Kachin	4 (4)	66 (80)	53 (53)	-	-	-	<b>123 (137)</b>
Kayah	1 (1)	15 (16)	9 (11)	-	-	-	<b>25 (28)</b>
Kayin	6 (6)	34 (34)	17 (14)	1	6 (6)	-	<b>60 (71)</b>
Chin	-	-	7 (7)	-	-	-	<b>7</b>
Sagaing	24 (24)	142 (201)	42 (51)	9	2 (2)	2 (2)	<b>221 (280)</b>
Tanintharyi	19 (19)	34 (36)	50 (53)	3	-	-	<b>106 (108)</b>
Naypyitaw	3 (3)	-	-	-	-	-	<b>3 (3)</b>
Bago	-	2 (2)	1 (1)	-	-	-	<b>3 (3)</b>
Magway	3	40 (37)	22 (25)	-	-	-	<b>65 (65)</b>
Mandalay	43 (43)	245 (269)	60 (70)	2	13 (7)	89 (3)	<b>452 (392)</b>
Mon	5 (5)	14 (18)	1 (3)	1	4 (8)	-	<b>25 (34)</b>
Rakhine	1 (1)	-	3 (3)	-	-	-	<b>4 (4)</b>
Shan (S)	16 (16)	86 (94)	49 (60)	3	2 (2)	- (-)	<b>156 (172)</b>
Shan (N)	21 (21)	47 (49)	18 (18)	2	10 (10)	- (-)	<b>98 (98)</b>
Shan (E)	2 (2)	68 (76)	26 (27)	3	- (-)	- (-)	<b>99 (108)</b>
Ayeyarwaddy	2 (2)	-	-	-	-	-	<b>2 (2)</b>
Yangon	-	-	-	-	-	1	<b>1</b>
<b>TOTAL 31 Jan 18 (31 Mar 17)</b>	<b>150 (150)</b>	<b>793 (915)</b>	<b>358 (396)</b>	<b>24 (0)</b>	<b>37 (35)</b>	<b>92 (5)</b>	<b>1454 (1498)</b>

Licences for mining exploration have been issued for almost every region or state, with the majority of exploration licences issued for Shan State (Table 1). Since the NLD government came to power in 2016, there has been a significant decline in licence issuing with a 6%

<sup>40</sup> <http://www.dica.gov.mm/en/topic/myanmar-citizen-investment-sector>

<sup>41</sup> Source: [http://www.mining.gov.mm/DM\\_mm/1.DM\\_mm/Details.asp?submenuID=8&sid=1189](http://www.mining.gov.mm/DM_mm/1.DM_mm/Details.asp?submenuID=8&sid=1189)

decline between October 2016 and March 2017, and a further 3% between March 2017 and January 2018. This is due to expiring licences not being renewed, and a de facto pause since 2016 on issuing mining licences due to environmental concerns and uncertainty about new Mines Rules. This has mainly affected small-scale mines. However, some permits have been issued. In particular 24 of a new form of 'integrated' permit, which covers the three phases from prospecting to feasibility have been issued for the first time in 2017, mostly in Sagaing Region and Shan State. The introduction of this 'integrated permit' has been implemented in response to the concerns of foreign companies that the Mines Law fails to guarantee 'conjunctive tenure' i.e. certainty of licence retention on progress into the next phase. There has also been a significant increase in small-scale processing permit issuance in Mandalay Region.

Informal mines, generally small or artisanal in scale, also operate throughout the country. In addition to informal mining activities, it is reportedly common for mining companies holding a formal exploration licence to be actively extracting, processing, and marketing ore and value-added mineral products.<sup>42</sup> While some try to pass this off as 'exploratory mining', it is in fact a breach of permit conditions. According to several mining industry stakeholders, it is also not uncommon for larger-scale operations to occur on small-scale concessions. For example small-scale permit-holders may operate machinery that is only allowed on large-scale concessions.

## C. Business Actors

### *Local and international companies*

Following the adoption of the State-Owned Enterprises Law in 1989, Myanmar began to gradually open up to private investment in the minerals sector, via its State-owned Enterprises (SOEs). These SOEs, each focusing on different commodities, operate through joint ventures (JVs) with Myanmar or foreign private companies, including military-affiliated companies.

There are restrictions on foreign investment in the sector (see Part 3: Legal and Policy Framework, Investment Law) and small-scale Myanmar mining companies form the majority of the sector. However, many small-scale 'Myanmar' operations, particularly in border areas, are backed informally by Chinese capital.<sup>43</sup> Foreign-owned mining companies must operate in joint venture agreements with Myanmar companies or nationals (see Part 3: Legal and Policy Framework). Relatively few foreign-owned mining companies currently operate in Myanmar. In 2016, a total of 71 foreign firms had registered to work in Myanmar's mining sector, although many were not active.<sup>44</sup> Other than Chinese, most foreign mining companies showing interest are Thai, Korean, and Australian.<sup>45</sup>

As is typical of an emerging mineral province, foreign company interest is primarily from small exploration companies, who will enter to test out exploration possibilities but lack the technical capacity or the finances to go to production stage. These companies hope to

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<sup>42</sup> MCRB field research, 2016

<sup>43</sup> MCRB interviews, 2016

<sup>44</sup> DICA, [Foreign Investment of Permitted Enterprises](#), 31 July 2016

<sup>45</sup> Gardiner et al, *ibid*, pp. 219-233

transfer their exploration licences to a larger company if a viable deposit is found. The 2015 amended Mines Law permits licence transfer, subject to the Ministry's approval.

### *Military-affiliated companies*

The two military-affiliated enterprises, Union of Myanmar Economic Holdings Limited (UMEHL), sometimes called 'oo-bine' (meaning 'holdings'), and Myanmar Economic Corporation (MEC), both have interests in Myanmar's mining industry. These companies are both owned and managed by military officials but have different ownership and reporting structures, the former being a company, the latter a state (military) owned enterprise.<sup>46</sup> There is limited public information about their activities. UMEHL's subsidiaries include Myanmar Imperial Jade Company and Myanmar Ruby Enterprise. Military personnel and their families are also reportedly among the largest licence-holders for mining jade and other precious stones.<sup>47</sup> MEC was founded in 1997 to establish profitable heavy industries capable of providing the armed forces with important supplies, including cement.<sup>48</sup> It is involved in limestone, marble, coal and gypsum operations in the Kayin and Shan State, and Mandalay and Tanintharyi Region. During SWIA research, many stakeholders including former MoNREC officials, mining companies and civil society representatives, raised concerns about the accountability of the military-affiliated companies. The authority of the mining sector SOEs and MoNREC to regulate these military companies is unclear.

### *Ethnic Armed Organisations (EAOs)*

Many EAOs are involved in the mining sector, and operate a parallel permitting and taxation system which is not recognised under the current constitution. Barriers for central government agencies in ensuring environmental and social compliance and co-option of local branches of government in corrupt practices were observed in EAO-controlled areas (see Part 5.6: Conflict and Security and Part 6: Region-Specific Governance and Conflict Analysis). Company representatives interviewed said that foreign investors (mostly Chinese and Thai) were able to invest in mining in areas controlled by EAOs by operating through local partner companies. Such practices were found to occur in exploration, extraction, processing and waste 'mining' and refining, especially in the gold and industrial minerals.

### *Myanmar Federation of Mining Associations*

The Myanmar Federation of Mining Associations (MFMA) is the national industry association for Myanmar miners and retailers of mineral commodities.<sup>49</sup> It federates the regional mining industry associations present in certain states and regions, such as the Mining Federation of Eastern Shan States. The vision and mission of MFMA include:

- Promoting the growth of the mining sector and developing it so that it is an important economic industry;
- Promoting foreign and local investment and technology for the development of mining;
- Conducting research to improve mining and processing procedures; and
- Forming an association in each state and division.

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<sup>46</sup> NRGI, [Gilded Gatekeepers: Myanmar's State-Owned Oil, Gas and Mining Enterprises](#), January 2016, p. 3

<sup>47</sup> *Ibid.*, p. 49

<sup>48</sup> MEITI, [Myanmar First EITI Report](#), December 2015, p. 48

<sup>49</sup> MCRB interview, 2016

The MFMA represents private sector investment in the mining industry. It includes a number of implementation and management committees, such as the Financing Committee, International Relations Committee, Environmental Conservation Committee, and the Research and Development Committee.

While the MFMA encompasses some members from the gems sector, the jade and gems sector is primarily organised separately, through the Myanmar Gems and Jewellery Entrepreneurs Association (MGJEA).

#### *International Investors for Mineral Development Association (IIMDA)*

On 15 December 2017, the newly formed IIMDA, representing around 23 mostly Australian, British, Canadian and US mining companies and their Myanmar JV partners met State Counsellor Daw Aung San Suu Kyi to discuss mining transparency and the need for the sector to adopt international best practice.<sup>50</sup>

## **D. Overview of the Limestone, Gold and Tin Sectors**

This Mining SWIA focusses on the production of limestone, gold and tin in Myanmar.

#### *Limestone extraction and cement production*

The key stages of limestone extraction include clearing extraction sites, often using a bulldozer, and stripping of topsoil, trees and vegetation using excavators. The subsequent stages include drilling and blasting to expose and excavate the desired rock, before loading excavated rock onto front-end loaders. The limestone is then crushed and separated in stockpiles, which are ultimately loaded onto trucks for transport to Yangon or other markets or storage places.

Myanmar's limestone production is split into two main types, depending on the physical properties of the stone. Stones with high calcium content are used as raw material for cement production. Limestone found to have a particularly beautiful colouring is used as dimension stone.<sup>51</sup> If the limestone is to be used for cement, it is very finely crushed and may be processed wet or dry. Wet processing entails purifying clay in a wash mill. The washed clay is then mixed with limestone which has been crushed into small pebbles, resulting in a raw slurry. The slurry is placed in a kiln in which high temperatures facilitate chemical reactions resulting in hard grey balls which are called clinker cement. As of 2016/2017, there is oversupply of clinker on Asian markets, much of it from China.<sup>52</sup> Clinker is ground to a fine powder which is mixed with gypsum to make cement. In the dry process, the same raw materials are mixed, but the mixture is dried, then pulverised. Cement mix may be produced as ready-mix or requiring additional clay before use. Myanmar is increasingly producing ready-to-use cement mixes, which usually fetch a higher value than less processed kinds.

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<sup>50</sup> Frontier Magazine, [Daw Suu stresses transparency, accountability in the mining sector](#), 22 December 2017

<sup>51</sup> International Cement Review, *The Global Cement Report*, Sixth Edition, 2005, p. 216

<sup>52</sup> LEK Consulting, [Asian Cement 2017: Looking to the Future](#), Tradeship Publications, March 2017

Myanmar's dependency on cement imports is decreasing as the construction of domestic plants increases national levels of cement production, something the government is encouraging. As of 2014, there were two state-owned and 12 privately-owned cement factories in Myanmar. This number has since increased. In 2014, MIC gave permission for nine additional factories to be constructed. Local investors are seeking to build cement factories in Mandalay Region and Mon, Kayin and Shan States, but in some cases face local opposition.<sup>53</sup>

The industry trend appears to be for domestic producers to predominantly sell their cement for government-sponsored projects, while the private construction industry is supplied to a much greater extent by imports, most frequently from Thailand. Some of the domestic cement production is also traded through local traders. Local traders typically organise for the cement to be transported by truck from the processing plants to the central storage depots in larger towns.

Common environmental and human rights impacts associated with limestone extraction and cement production include deforestation and damage to biodiversity, dust creation, with associated health impacts, as well as noise and vibration. Given the high energy demands of cement plants, often using coal, there are environmental and human rights impacts associated with the fuel and power source.

#### *Gold extraction, recovery and processing*

Broadly speaking, there are two main types of gold deposits present in Myanmar's geology: placer and hard rock ore. In alluvial or placer deposits, a concentration of the mineral is present amongst loosely packed sedimentary material. Hard rock deposits include quartz veins present inside rock mass, sometimes buried deep underground.

Placer deposits are typically much easier to access and excavate, so subsistence miners generally extract alluvial gold.<sup>54</sup> Gold in placer deposits can be extracted using simple methods such as gold panning and sluicing, which result in the direct recovery of small pieces and flakes of gold. Alluvial deposits may also be broken down with high-pressure jets of water, called hydraulic mining or hydraulicking. Panning, suction dredging, hydraulic mining and riverbank mining are the primary artisanal and small-scale (ASM) mining methods for recovering gold from alluvial sediments in Myanmar.

Quartz veins, on the other hand, may be many metres underground, covered by many metres of rock mass and so may require more sophisticated exploration techniques and mining equipment both to discover and to extract. Non-quartz, hard rock deposits are extracted by both ASM miners (to a lesser extent than placer deposits) and large-scale industrial mining companies, both using both open pit and sub-surface mining techniques such as shaft mining.<sup>55</sup>

Once excavated, the gold ore will be crushed and/or sluiced prior to cyanidation and/or mercury amalgamation – a process where the gold ore and mercury are mixed to form an

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<sup>53</sup> Irrawaddy, [Over 2,500 villagers protest against MCL's power plant](#), 21 February 2017

<sup>54</sup> Images Asia and Pan Kachin Development Society, [At What Price](#), November 2004, pp. 23-30

<sup>55</sup> Images Asia, *ibid*, p. 25



alloy which is burnt by miners, causing the mercury to evaporate – in order to separate the gold from waste rock, soil and other sediments. Cyanidation is nominally banned in Myanmar, except for exemptions at a few key, large-scale gold projects. If cyanidation is controlled, it is a safer process which produces a higher gold yield than the mercury amalgamation more frequently undertaken by ASM miners.<sup>56</sup> If mercury is added at this stage in the process, the mercury amalgam is squeezed, often by hand, then burned by the miner who can see the process occurring as it happens. This is important, as even where ASM miners may be leased access to cyanidation facilities of some officially permitted large-scale mines, many are frequently reluctant to use cyanidation as they are unable to observe what happens inside the facility of that large-scale mine and therefore do not trust that they will recover the full yield of their gold from the facility.<sup>57</sup>

Common environmental and human rights impacts associated with gold extraction and production are covered below (see Artisanal and Small-scale Mining).

### *Tin extraction and concentration*

Myanmar has many primary deposits and placer tin deposits (where weathering has caused deposits to mix with sediments over time), and high alluvial concentrations of cassiterite (tin ore) in the gravel in streams and on riverbeds.<sup>58</sup> As with gold, alluvial deposits are especially advantageous and accessible for artisanal miners as there is no primary ore to crush. Excavation is easily achieved using basic tools such as shovels or smaller diggers.<sup>59</sup> Following excavation, the tin is concentrated through gravity separation by using a sluice or shaking table, which allows for the recovery of varying grades of tin.

Unlike many types of processing for gold, the gravity separation method used for winning tin concentrates does not rely on chemicals. Instead, water is used as the separation medium in the process in which the difference in specific gravity is utilised to separate tin and associated gangue (the commercially valueless material in which ore is found). This means that the process is not hazardous to human health. However, when tin is associated with tungsten in veins, sulphide minerals are commonly included in the gangue. This poses health problems as some flotation methods use chemicals in the separation process. The grade of tin mineral is also significantly lowered depending on the tungsten content. Magnetic separators are normally used to separate tungsten from tin as a clean-up process prior to export.

At present, there are limited smelting facilities in Myanmar. Most tin concentrate is exported to Thailand, Malaysia or China for smelting, legally or illegally.<sup>60</sup> The one government-owned smelter, near Yangon, run by Mining Enterprise No. 2 (ME-2), appears to be only intermittently operative, and ME-2 is currently looking for private investors to upgrade the facility and expand production capacity.

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<sup>56</sup> Images Asia, *ibid*, pp. 27-30

<sup>57</sup> MCRB interview, 2015

<sup>58</sup> Gardiner et al, *ibid*, pp. 219-233

<sup>59</sup> MCRB field research, 2016

<sup>60</sup> MCRB interviews, 2016

Common environmental impacts associated with tin extraction and production include water strain and scarcity.<sup>61</sup> Processing is water-intensive and produces large amounts of wastewater containing leftover dust and silt. This may cause significant environmental impacts if not properly managed, including siltation of rivers and waterways with impacts on aquatic life, and wastewater flooding of community land.<sup>62</sup> However, given that no chemicals are needed to refine or concentrate tin, the environmental impacts observed in Myanmar were found to be less pronounced than the pollution caused by gold production. Globally, tin extraction has been linked to conflict and related human rights violations, especially in the Democratic Republic of the Congo and the surrounding Great Lakes regions (see Conflict Minerals, Chapter 3).<sup>63</sup>

## E. Subsistence/Artisanal and Small-scale Mining (ASM)

### *Overview of ASM and subsistence mining*

ASM is characterised by the use of rudimentary, labour-intensive techniques for mineral extraction, often under hazardous conditions. ASM miners generally lack capital, access to support services, health and safety protection, and occupational expertise.<sup>64</sup> ‘Illegal mining’ generally refers to activities that defy applicable legal frameworks. However, there is often no applicable legal framework for ASM workers to operate under, leading them to work without formal or legal permits. A key driver for ASM is poverty; small-scale or artisanal mining often provides the main source of livelihood for many poor communities. Globally, it is estimated that artisanal mining employs over 20 million people and that 80 to 100 million people’s livelihoods are dependent on it. ASM is responsible for 15-20% of global metals and minerals production, particularly for gold, sapphire and diamonds.<sup>65</sup>

ASM provides considerable economic opportunity for many poor communities. In some country contexts it can generate around five times the income of other rural-based poverty driven activities, such as small-scale fishing and forestry, and therefore represents a divergence from more traditional livelihoods and an escape from rural agrarian poverty.<sup>66</sup> For some, it can lead to income diversification. For others it is a primary livelihood activity that provides greater financial returns than income from other sectors.<sup>67</sup> ASM represents an important component of the livelihood of women in mineral-rich regions.<sup>68</sup> The higher income from mining relative to farming was also mentioned by artisanal gold miners in Myanmar interviewed by MCRB.<sup>69</sup> Many farmers may also depend on ASM during off-peak months of harvesting or in years when crop yields are poor. MCRB research indicated that a loss of land may also lead communities who previously farmed to turn to mining, either during the whole year or parts of it. This loss of land may be due to mining activity, including through land seizure by ASM miners, or pollution which had rendered land previously leased out to ASM miners unfit for crop cultivation.

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<sup>61</sup> Gardiner et al, *ibid*, pp. 219-233

<sup>62</sup> MCRB interviews; MCRB field research 2015-2016

<sup>63</sup> Global Witness, [Briefing: Conflict Minerals in Eastern Congo](#), 2 March 2015

<sup>64</sup> IIED, [Responding to the Challenge of Artisanal and Small Scale Mining](#), 2013

<sup>65</sup> World Bank, [Artisanal and Small-Scale Mining](#), 21 November 2013

<sup>66</sup> IIED, [Responding to the Challenge of Artisanal and Small Scale Mining](#), 2013

<sup>67</sup> MCRB field research, 2016

<sup>68</sup> World Bank, [Artisanal and Small-Scale Mining](#), November 2013

<sup>69</sup> MCRB field research, 2016

### *Common environmental and human rights impacts associated with ASM*

A common practice for gold refinement in ASM is the use of **mercury amalgamation** which creates toxic mercury vapour.<sup>70</sup> ASM gold mining is the world's largest anthropogenic source of mercury emissions worldwide, releasing 727 tons of mercury into the environment every year, approximately 35% of total global emissions.<sup>71</sup> This is directly harmful to humans. Mercury emitted into the atmosphere enters the food chain and bio-accumulates in harmful quantities. In Myanmar there are no official statistics regarding mercury emissions, but the abundance of ASM activity and widespread malpractice in purifying gold suggest high levels of mercury emissions into the environment. Fish sampling in the Ayeyarwady River, one of the main water sources in Myanmar, found almost half of the fish tested to contain higher concentrations of mercury than the limit for human consumption set by the US Environmental Protection Agency.<sup>72</sup> (See Section 4, Sector Level Impacts).

Another environmental challenge affecting the human right to health is the use of **cyanide** in gold ASM processing. Using cyanide in a chemical leaching process can yield extremely high recovery rates for gold concentrate. Cyanide is a degradable compound when managed properly, making it a sustainable alternative to mercury in large- and small-scale mining.<sup>73</sup> However, cyanide waste is frequently dumped into water sources by ASM operations, creating potential for poisoning and other adverse health effects.

Other adverse environmental impacts associated with ASM include **siltation and soil erosion, deforestation, loss of biodiversity**, and the creation of 'moonscapes' through the **lack of site rehabilitation**.<sup>74</sup>

Preventing adverse health impacts from ASM is challenging, in view of the nature of the activity. Workers often operate in hazardous conditions, handling chemicals without proper equipment. Overexertion, inappropriate workspaces, and frequent workplace accidents are common.<sup>75</sup> Without improved occupational education and access to equipment, regulatory reform will not be effective. ASM by its nature also occurs in remote, resource-rich areas where there is little access to clean water and healthcare. Workers often form temporary settlements in these remote areas, which are unlikely to have basic public health facilities and infrastructure necessary to support the temporary inhabitants. The settlements often attract sex work and drug use, leading to increased rates of sexually transmitted infections, tropical diseases, and HIV. Furthermore, the effects of pollutants such as mercury and cyanide can cause irreparable damage and health effects.

Women and children are often victims of human rights abuses due to ASM. Women and girls face unique challenges associated with ASM, as they are involved in many stages of the processes but do not always experience the same benefits as men. While women and girls living and working in ASM communities may not be involved in the physically intensive aspects of mining, they more often handle the chemical operations, sometimes burning

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<sup>70</sup> Images Asia, *ibid*, p. 27

<sup>71</sup> UNEP, [Global Mercury Assessment](#), 2013, p. ii

<sup>72</sup> WCS, [Status and Conservation of Freshwater Populations of Irrawaddy Dolphins](#), May 2007, p. 22

<sup>73</sup> UNEP, [Guide to Reducing Mercury Use](#), 2012, p. 54

<sup>74</sup> May Zin Thaw and Jack Jenkins Hill, *Artisanal and Small-Scale Mining and Mercury Use in Myanmar: Current Issues and Ways Forward*, 2015, on file with MCRB

<sup>75</sup> IIED, [Responding to the Challenge of Artisanal and Small Scale Mining](#), 2013, p. 7-9

amalgam indoors over an open flame with no proper equipment, risking extended exposure to toxic fumes for them and their babies. They also experience lower salaries for similar tasks, additional domestic responsibilities, and hazardous work during pregnancy, and prostitution. As for children, child labour is prevalent in ASM. It is considered one of the worst forms of child labour by the ILO because of the serious health and occupational risks.<sup>76</sup> The physical strain of mining, time away from school, exposure to harmful chemicals, and clear violation of international frameworks make child labour in ASM a serious threat to children's health, safety, and other human rights.<sup>77</sup>

ASM often comes into conflict with large-scale mining operations. Since most ASM workers operate without permits, they generally do not have recognised land rights, leading to disputes between ASM workers, governments, and mining companies. Conflicts and long-term disagreements often arise, particularly when ASM competes for the same resources as large-scale industries. In many cases, police and law enforcement have to mediate clashes. Where governments allocate land in favour of large-scale mining, many ASM workers face involuntary resettlement and violation of their rights to housing and property.<sup>78</sup> Without formalisation of the ASM sector and possibilities for people to obtain land permits, these problems are likely to persist.

#### *ASM practices, and the legal and regulatory framework in Myanmar*

Artisanal mining is prevalent in all the commodities covered by the SWIA, particularly gold. There are extensive primary and placer gold deposits found throughout the Kachin, Kayin, Mon, Shan, and Kayah States, as well as the Bago, Sagaing, Mandalay, and Tanintharyi Regions.<sup>79</sup> ASM for tin was observed on and around formally permitted mine sites, with companies authorising and even organising this type of extraction. Artisanal mining of limestone was also observed during MCRB field research.

Artisanal or subsistence mining in Myanmar is almost entirely informal. In principle, the legal framework to regulate it is the 2015 amended Myanmar Mines Law.<sup>80</sup> This attempts to formalise the sector by defining subsistence mining as mineral production using either ordinary hand tools or machinery equipment of limited horsepower. The amended Law decentralises the application process, to facilitate access to permits.<sup>81</sup> To obtain a licence for subsistence production, miners previously had to make an application to the SOE overseeing production of the mineral the subsistence miner wished to extract. Under the amended Law prospective miners may apply for subsistence, small- and medium-scale permits, to the State or Region Plot Scrutinizing and Permit Granting Board once these are formed by the Union Government.<sup>82</sup>

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<sup>76</sup> ILO, [Eliminating Child Labour in Mining and Quarrying](#), 2005

<sup>77</sup> IIED, [Responding to the Challenge of Artisanal and Small Scale Mining](#), 2013, p. 8

<sup>78</sup> *Ibid.* p. 8-9

<sup>79</sup> Zin Thaw and Jenkins Hill, *ibid*

<sup>80</sup> Valentis Resources, [2015 amended Myanmar Mines Law \[unofficial translation\]](#), 27 January 2016

<sup>81</sup> Zin Thaw and Jenkins Hill, *ibid*

<sup>82</sup> Zin Thaw and Jenkins Hill, *ibid*

Subsistence mining permits have a one year duration under the Law. Under Rule 97 of the 2018 Mines Rules<sup>83</sup>, subsistence mining plot size is defined as:

- < 1 acre for gold and other valuable metals (and for gold plots, only 1 plot may be granted per household)
- < 3 acres for other metals
- < 5 acres for industrial raw minerals or stones.

While a welcome step towards recognition and formalisation of subsistence mining, neither the Law nor the Rules reflect its reality. Nor do they encourage efficiency through use of mechanised tools. For instance, Rule 97c says that subsistence mines will have to fulfil the requirements of the EIA Procedure, which under its Annex 1 (Table 4) requires all gold mines of *less than* 20 acres to undertake an Initial Environment Examination (IEE). This means that an IEE will be a requirement for individual subsistence gold mining permit-holders, unless Annex 1 is amended (which it is understood is under consideration by ECD/MoNREC).<sup>84</sup> This, and the requirement for Mine Closure Plan, clearly bears no relationship to the reality of subsistence mining and underlines the need for separate Rules for subsistence mining.

Furthermore, if small-, medium or large-scale operations are given rights to, or express interest in, an area, subsistence permits immediately expire. The resulting economic displacement of subsistence miners has been seen to push miners into illegal extraction of forestry products in Kachin State.<sup>85</sup> During MCRB field research this was also found to have caused violent clashes between dispossessed subsistence mining communities and in-coming companies. Finally, the 2015 amended Myanmar Mines Law also introduces harsh penalties for those found mining without a permit, including fines and jail time.

Subsistence miners are also exposed to the risk of fines for use of mercury. While mercury is technically a controlled substance under 2013 Prevention from Danger of Chemical and Associated Materials Law, punishable by up to seven years jail, controls are not enforced. It is readily and cheaply available in mining areas and appears primarily to be imported illegally from India and China.<sup>86</sup>

It is understood that no subsistence permits were awarded during the consideration of the amendments to the Mines Law, and very few subsistence permits have been issued since (Table 1 shows 37 permits exist countrywide as of 31 January 2018, most of them in Mandalay Region). Through payment of rents, informal taxes to local militias, companies, EAOs and government authorities, subsistence miners therefore operate outside of the Mines Law. Many ASM workers depend on mining for supplementary income and only mine a few months of the year. This also reduces the incentive to obtain a permit. As a result subsistence miners are generally operating illegally without permit, oversight, or

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<sup>83</sup> Approved by Cabinet and issued under MONREC Order 13/2018 of 13 February 2018 and sent to Parliament. Copy on file with MCRB

<sup>84</sup> Similarly unrealistic requirements have been adopted in the 2017 Law 15/2017 on Artisanal Oil Mining. See [MCRB comments](#) submitted in June 2017 on the weaknesses of the draft law, which was adopted almost unchanged in July 2017.

<sup>85</sup> Images Asia, *ibid*, p. 8.

<sup>86</sup> MCRB interviews, 2015.

government revenue collection while risking fines that could plunge them further into poverty.<sup>87</sup> (See also Part 4, Sector-Level Impacts).

## F. The Mining Value Chain

This SWIA focuses on certain segments of the mining industry value chain, namely permitting, extraction and initial processing. MCRB field visits were undertaken to sites in the exploration, operations (extraction and processing) and post-mine closure phases of the mine lifecycle. Mineral concentration and beneficiation processes were also included in the scope of the research. Segments such as financial services, import and export, transportation, sales and specialised mining subcontractors were not considered.

The majority of mining operations in Myanmar are small-scale projects. This means that the specifics of their value and supply chains may look very different to the way in which value accrual is organised in industrial, large-scale mining. Mining workforces frequently consist of untrained staff and many operations are in the informal economy. Such skill gaps constrain foreign investment in the sector. According to foreign mining companies operating in Myanmar, access to skilled labour, such as local contractor support for drilling, was very limited. Accredited sampling labs (where drill samples are analysed during mineral exploration activities) were said to be non-existent in the country. Some companies used government testing labs for testing drill cores during the exploration phase.<sup>88</sup>

Myanmar's small-scale miners rely less on external services, investment capital and utilities than large-scale operations. For example, if exploratory drilling and sampling is actually undertaken, small-scale Myanmar companies do not rely on external, technical service providers.<sup>89</sup> Small-scale prospectors frequently buy simple equipment and provide only basic, internal training for workers in how to operate it. Such practices create issues of efficiency and safety in core drilling and mining, in both exploration and production phases. Many inputs to the extraction process are imported from China including excavators, crushers, grinders, as well as chemicals for processing or unlicensed gunpowder. The SWIA team heard complaints about quality.<sup>90</sup>

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<sup>87</sup> Zin Thaw and Jenkins Hill, *ibid*; International Growth Centre, [Natural Resources and Subnational Governments in Myanmar](#), 2014, p. 9

<sup>88</sup> MCRB interviews, 2015

<sup>89</sup> MCRB field research, 2016

<sup>90</sup> MCRB interviews, 2015