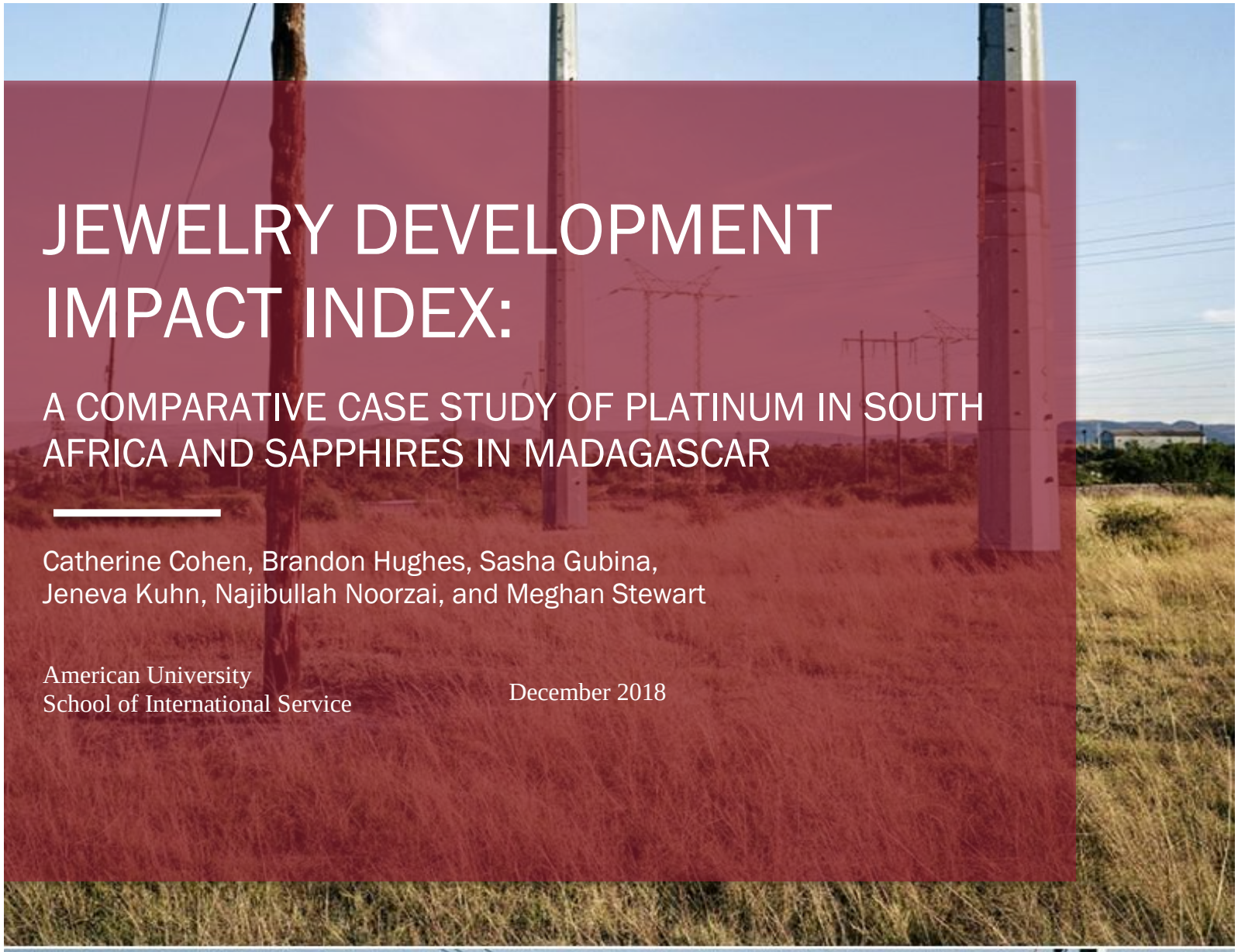

JEWELRY DEVELOPMENT IMPACT INDEX:

A COMPARATIVE CASE STUDY OF PLATINUM IN SOUTH AFRICA AND SAPPHIRES IN MADAGASCAR

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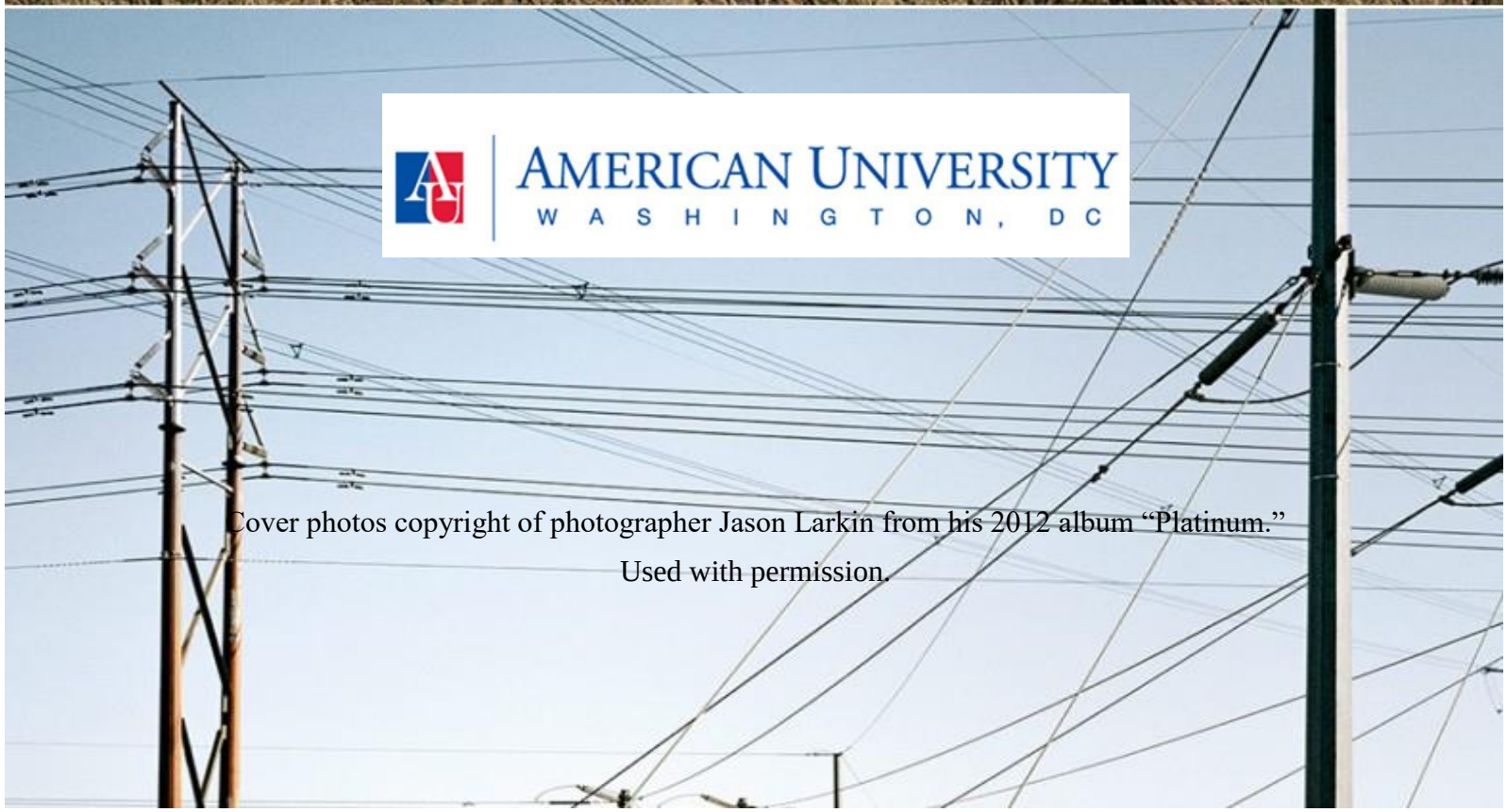
December 2018



Executive Summary

This report presents the findings of a research project that is the third in a series carried out by graduate students in the School of International Service at American University in fulfillment of their MA capstone requirement. The principal objectives of the report are: (1) to undertake detailed case studies on the potential risk to human security posed by certain precious mineral and gem industries in select countries, and (2) to propose a methodological framework for creating an index which attempts to assess degree of risk. The cases examined in this report involve the platinum industry in South Africa and the sapphire industry in Madagascar. The human security risks are assessed according to categories established by UNDP: governance, economy, health, environment, and human rights. Data was culled from academic journals, news articles, business sector and NGO reports, analysis of relevant indices, and interviews with key stakeholders in the precious mineral and gem industries in the two countries. In consulting a broad base of sources, our research team was able to triangulate a good deal of relevant information and thereby draw a clearer picture of human security risks.

The aim of the case studies was to provide as objective and accurate an account as possible of the effect of precious mineral and gem industries in the two host countries. Precious mineral and gem industries can benefit host countries enormously, especially through the provision of high paying jobs and other economic opportunities. However, such benefits do not always come without costs to human security. Through the case studies presented in this report, as well as those detailed in previous reports, we have attempted to identify positive and negative risk factors and apply them in the construction of a methodological framework for a country-level index.

The new methodological approach we propose is based on the scoring of questions within each category of human security which assess the presence or absence of risk-increasing or risk-reducing factors. Possible answers to each question are defined, as much as possible, in a way that is mutually exclusive and jointly exhaustive, and then assigned point values depending on whether they indicate increased or reduced risk to human security. Countries are scored on a scale from 0 to 10, where 0 indicates no risk and 10 indicates very high risk. In the final iteration of the index methodology, stakeholder experts can provide scoring for individual countries based on the same set of scoring questions. We view this set of scoring questions as a first iteration and a jumping off point for further identification of factors as well as multi-stakeholder feedback.

According to the proposed methodology, we identified country risk scores for both the platinum industry in South Africa and the sapphire industry in Madagascar. South Africa has an overall moderate level of risk at 4.58 out of 10. South Africa's lowest level of risk comes to human rights at 2.29, while its highest level of risk comes to environment at 6.26. South Africa benefits greatly from the economic opportunities of its platinum industry, but must take action to mitigate risks to health and environment. Madagascar has a higher overall level of risk at 5.74. This is largely the result of the informal nature of its sapphire industry. Madagascar's highest level of risk is posed to health at 8.58, while the lowest level of risk is posed to governance at 4.02. To lower its overall level of risk and benefit more from its natural resource, Madagascar must work to formalize its industry. Detailed policy recommendations for each risk score can be found in Chapter 9, Section 4.

Key Terms and Abbreviations

AQI	Air Quality Index
CSR	Corporate Social Responsibility
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
ILO	International Labor Organization
IPEC	International Program for the Elimination of Child Labor
NGO	Non-Governmental Organization
NIHL	Noise-Induced Hearing Loss
PTB	Pulmonary Tuberculosis
USD	United States Dollar

Related specifically to South Africa:

AMD	Acid Mine Drainage
ANC	African National Congress
BEE	Broad-based Socio-Economic Empowerment Charter
DE	Department of Energy
DEA	Department of Environmental Affairs
DMR	Department of Mineral Resources
D&O Mines	Derelict and Ownerless Mines
DWS	Department of Water and Sanitation
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
EMI	Environmental Management Inspectorate
EMPR	Environmental Management Program
EPI	Environmental Performance Index
HDSA	Historically Disadvantaged South Africans
IPIC	Inter-departmental Project Implementation Committee
MINTEK	Council for Geoscience and Council for Mineral Technology and Research
MISTRA	Mapungubwe Institute for Strategic Reflection
MPRDA	Mineral and Petroleum Resources Development Act
NEMAQA	National Environmental Management: Air Quality Act
NEMPAA	National Environmental Management: Protected Areas Act
NPA	National Prosecuting Authority
NWA	National Water Act
ODMWA	Occupational Diseases in Mine and Works Act
PAIA	Promotion of Access to Information Act
PGMs	Platinum Group Metals
R	South African Rand
SAMRAD	South African Mineral Resources Administration System
SLP	Social and Labor Plan
SWSAs	Strategic Water Source Areas
WULs	Water Use Licenses

Related specifically to Madagascar:

ASM	Artisanal Small-Scale Mining
BIANCO	Independent Anti-Corruption Bureau
BCMM	Mining Cadastre Bureau of Madagascar
CIMF	Inter-Ministerial Mining and Forest Committee
EEP	Environmental Engagement Plan
IGM	Gemological Institute of Madagascar
LSM	Large-Scale Mining
MGA	Madagascar Ariary
MSM	Medium-Scale Mining
NBSAPs	National Biodiversity Strategies and Action Plans
OMNIS	Office des Mines Nationales et des Industries Stratégiques

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Introduction

The jewelry-making industry has existed for thousands of years, developing independently in societies around the world and evolving into a complex network of markets that has become globalized. Today, jewelry is more accessible and popular than perhaps ever before, with ordinary people purchasing pieces that were once within the reach of a very select elite. The industry is not without challenges, however. Its factors of production, the precious metals and stones that comprise the jewelry we buy, as well as the people who mine, forge, and sculpt it, are sourced from nearly every continent, often in countries that grapple with various human security challenges. Economic growth stimulated by the industry results in greater foreign direct investment, increased local employment, higher wages, and enhancements in public revenue and social services. At the same time, concerns are voiced about the industry's impact on human rights, on the environment, and criminal activities. There is general agreement that practices which result in negative externalities should be reformed and those which create positive ones replicated. The difficulty, however, is that there is a lack of an effective, uniform metric with which to identify and measure the risk posed by industry activities to human welfare.

This report, compiled by graduate students at American University in cooperation with partners at the U.S. Department of State, Office of Threat Finance Countermeasures, and the University of Delaware, Minerals, Materials, and Society Program strives to contribute to the development of an evidence-based metric, called the Jewelry Development Impact Index (JDII), intended to address the need for risk evaluation and accountability and benefit all stakeholders. Expanding upon the work of previous American University graduate student research teams, the report also examines the challenges to human security by two country-specific extractive industries, sapphire mining in Madagascar and platinum mining in South Africa, both of which are significant contributors to global jewelry production and trade. The risk these industries pose to human security is assessed in accordance with categories established by the United Nations, which consist of the following: 1) governance, 2) economy, 3) health, 4) environment, and 5) human rights, with the addition of a section focusing on supply chain governance. Our research team applied the methodology used in the previous case studies for a six-country comparison. We also propose a new methodology to be refined by future practicum groups. It is expected that this process will ultimately lead to the development of a highly reliable JDII.

Chapter 1: Historical and Cultural Background

1.1. South Africa

South Africa's economy was transformed by the discovery of the Witwatersrand goldfields in 1886. Its mineral wealth was industrialized in the 1860s when the world's largest diamond deposits were discovered in the city of Kimberley in the Northern Cape Province. In 1924, the government discovered the largest global reserves of platinum group metals (PGMs) (Corruption Watch, 2017). Most of the platinum mines are located in the North West Province of the country, a region which produces the world's largest supply of the metal. The five largest platinum mines are located in the Rustenburg area, which is known as Bushveld Igneous Complex (South Africa Tourism, n.d.).

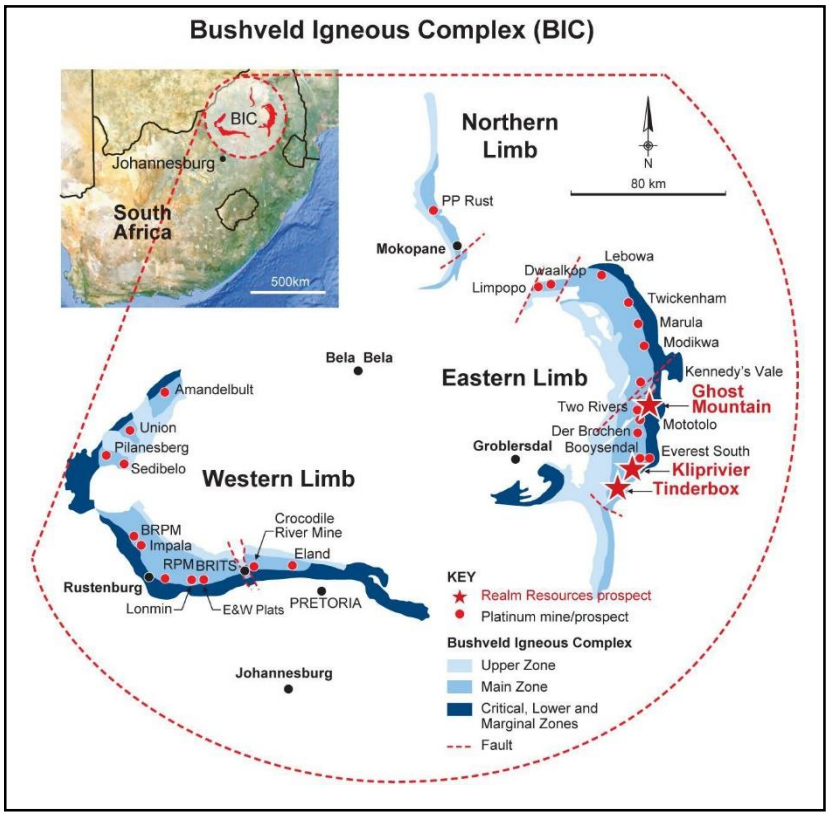


Figure 1. South Africa's Mine Sites called Bushveld Igneous Complex (BIC), Retrieved from http://www.realmresources.com.au/site/ShowStaticCategory.aspx?CategoryID=210&HideTopLine=True

From 1948 until 1990, the white minority controlled the political and legal system of South Africa under the apartheid regime that excluded the black majority from enjoying the political

and economic benefits of full citizenship. Under apartheid law, the white minority could take up skilled and semi-skilled work, whereas the black majority was relegated only to menial, low-skilled labor (South Africa Tourism, n.d.; Odeku, 2015). When the apartheid regime ended after years of peaceful resistance led by Nelson Mandela and the African National Congress (ANC), a full-fledged constitutional democracy was instituted. The newly elected government transformed the socio-economic landscape in South Africa by implementing the Reconstruction Development Program (RDP) that mobilized all people of South Africa (both white and black) and directed resources towards the eradication of apartheid and the building of a democratic, non-racial, and non-sexist state. Based on the RDP, the Department of Mineral Resources (DMR) of South Africa enacted the Mineral and Petroleum Resources Development Act (MPRDA) and subsequently the Mining acts that ensure that historically disadvantaged South Africans benefit from the natural resources of the country (HDSA) (BBBEE, 2004).

1.2. Madagascar

Sapphire mining, which began in earnest only in the 1990s, is a relatively new industry in Madagascar. Though it was known that Madagascar had precious gemstone resources because of its geography, abundant mines were not discovered until 1996 (Walsh, 2012). Since the discovery of the gemstone mines, Madagascar has become a lead producer of high quality sapphires, with approximately 40% of the world's supply coming from the island country (Flores & Zavala, 2017). Sapphire mines in Madagascar are primarily located in the northeast and southwest regions of the country, with some of the highest quality sapphires found in the Alaotra-Mangoro and Ihorombe regions (Duffy, 2007).

Figure 2. Map of Sapphire Mining Areas. Source: All About Gemstones (2011). Retrieved from https://www.gemstoneuniverse.com/blog/syamantaka/

Madagascar's sapphire production varies depending on the location of short-term mining "rushes." Sapphire mining rushes have occurred regularly over the past two decades. The most recent rush took place in 2017. The rushes attract thousands of miners to sapphire-rich sites, often in small towns or rural areas. In remote areas, mining rushes have created boomtowns with thousands of people dependent on the gemstone industry (Flores & Zavala, 2017). While the rushes contribute to the development of nearby cities, this growth is only temporary. After the mining sites' resources are exhausted, miners leave the cities, stunting growth. In addition to the rushes, those who mine for sapphires more consistently tend to move locations frequently in an effort to find the next mining rush. Consequently, local economies near the sapphire mining sites are not permanent or sustainable.

While a world leader in sapphire extraction, Madagascar produces limited data on the growth and impact of its mining industry. While still in the early stages of development, the discovery of the gemstone has created both economic and geographical changes in sapphire-rich areas. As a result, the government has had to quickly develop regulations intended to minimize the negative impacts of sapphire mining. The development of regulations, however, has been halted by political unrest over the past two decades.

Chapter 2: Governance Challenges

This chapter will focus on domestic governance and legislation relevant to the platinum and sapphire jewelry development industries in South Africa and Madagascar, respectively. The role that national governments play in impacting local mining populations is of particular interest. Analysis is broken down into five subcategories most relevant to this area of inquiry: governance and accountability, transparency, corruption, industry regulation, and presence of criminal non-state actors and organizations.

Larkin, Jason. (Photographer). 2014. Scene from 2014 South African national and provincial elections. Copyright of Jason Larkin from album "Tremors Below." Used with Permission.

2.1 State of Governance and Accountability

South Africa

Following apartheid, the newly elected government in South Africa led by the then President Nelson Mandela took a series of steps to promote equality and accountability. The government of South Africa drafted and enacted a constitution based on the values of human rights and the principles of democracy, holding free and fair elections and promoting accountability and responsiveness (Constitution of South Africa, 1996). In the past two decades, five national assembly elections have been held in South Africa. The African National Congress (ANC) has continuously remained the dominant political party in the government.

In 1994, the Government of South Africa developed the Reconstruction and Development Program (RDP) comprised of a comprehensive and detailed socio-economic plan for transforming the political, social, and economic spheres in South Africa. In line with the RDP, the successive governments in South Africa enacted numerous laws, policies, and strategies for promoting good governance, accountability, and rule of law in South Africa (Wessels, 1999). Despite the legal frameworks, the government of South Africa has faced numerous challenges that have affected good governance and accountability in the country.

In the mining sector, the government enacted the Mineral and Petroleum Resources Development Act (MPRDA) in 2002. This act has been the key legislation for regulating the acquisition and right to conduct reconnaissance, prospecting, and mining in South Africa. Based on the MPRDA, the DMR is the designated institution for regulating the acquisitions and rights to conduct reconnaissance, prospecting, and mining in South Africa (MPRDA, 2002).

Madagascar

Over the past two decades, Madagascar has experienced political unrest that has impacted its state of governance. Most recently, this unrest followed the 2002 elections, where candidate Marc Ravalomanana campaigned against the then-president Didier Ratsiraka. Ravalomanana received more votes than Ratsiraka, but did not have the 51% majority required to take office. Despite not having the majority, he declared himself winner of the elections (IRIN, 2010). Ratsiraka supporters responded by cutting off communication and roads leading to the capital

without access to the ocean (Ploch, 2010). Despite the crisis, Ravalomanana and his allies successfully controlled most of areas of Madagascar, and Ratsiraka fled the country.

In 2008, a series of protests led by Andry Rajoelina, mayor of the town Antananarivo, broke out against Ravalomanana's government. Rajoelina and protestors argued that Ravalomanana was limiting people's freedoms, such as freedom of the press and freedom of speech. Protests between the opposition and Ravalomanana's military became violent in 2009, when the opposition targeted government buildings and Ravalomanana ordered the military to fire at protestors. The military, however, later refused to take orders from the government, since they believed that the government was oppressing its own citizens. This led to a military coup, and Ravalomanana stepped down from the presidency. Following the coup, a five-year transitional government directed by Rajoelina was established, but corruption became rampant, and the government struggled to establish legitimacy (IMF, 2017). Free elections took place in 2014 and Hery Rajaonarimampianina was elected president of Madagascar.

As a result of the political unrest occurring in parallel to the rise of the gemstone mining industry, governance of the artisanal/ small-scale mining (ASM) industry remains stagnant and relatively unregulated, though the large-scale mining (LSM) of gems, occurring on almost a negligible scale in Madagascar, is subject to slightly better governance. The nature of the governance of the mining industry, however, will depend on the results of the 2018 elections. One decade after the protests instigated by Rajoelina against the then-president Ravalomanana in 2008, Rajoelina and Ravalomanana are the two candidates for the presidential elections to be held on December 19, 2018.

The government institution that regulates the mining industry is called the Ministère des Mines et du Pétrole (Ministry of Mines and Petroleum, n.d.). The ministry was created to support good governance in the country and to develop Madagascar's economic and mining sectors. The ministry is also responsible for ensuring the mining sector is accessible for Malagasy citizens. Within the ministry, the Office des Mines Nationales et des Industries Stratégiques (OMNIS) was established in 1976 to reinforce parameters relevant to the mining industry and assure the security of the country's natural resources. However, OMNIS is not well-known among Malagasy citizens, and there is a disconnect between the formal mining regulations and the information actually communicated to citizens from the government (Rabefiringa, n.d.).

While the government has the appropriate institutions in place to regulate the mining industry, regulating the ASM industry, which comprises the majority of sapphire mining in Madagascar, remains a challenge for the government. As a general rule, research and documentation aids in the implementation and enforcement of mining policies. Yet, the vast informal ASM industry in Madagascar lacks the extensive research and documentation necessary to effectively regulate and monitor the industry. Most of the artisanal gemstones in Madagascar are mined informally or without the correct licensing. Due to the lack of oversight, there is also a lack of accountability. Adding to these difficulties, most government regulations only concern the exporting of sapphires, rather than their extraction or refinement.

2.2 Transparency

South Africa

The successive governments in South Africa have tried to enact law, policies, and strategies to promote transparency. In 1999, the Government of South Africa passed the Open Democracy Bill which gives citizens of South Africa the right to access government information and remain protected if they expose any malpractices or corruption scandals in the government institutions. South Africa also enacted the Promotion of Access to Information Act (PAIA), which allows South Africans further access to public information. As a result, according to the Open Budget Index, South Africa scored 89 out of 100, second only to New Zealand for its transparency in sharing and disclosing extensive information about its national budget. South Africa is also a participant member of the Open Government Partnership, which is a Steering Committee that facilitates cooperation between government reformers, activists, and civil society leaders to create action plans that make governments more inclusive, responsive, and accountable (International Budget Partnership, 2017).

Yet at the same time, the Transparency International's Corruption Perceptions Index has consistently ranked South Africa as a country with a moderate level of corruption. The index ranks countries on a scale of zero to 100, where 100 represents no perceived corruption, and zero represents high levels of perceived corruption. South Africa's score in 2017 decreased to 43, compared to the previous year's score of 45; its ranking declined from 71 to 64, among 180 countries. The main reason for this lower score can be attributed to the corruption scandals during President Jacob Zuma's administration (Freedom House, 2018). Since 2012, South

Africa's score has remained below 50, indicating that corruption in South Africa's public sector is endemic and exemplified in high rates of bribery, irregularity in procurement, embezzlement of funds, and theft of resources (Corruption Watch, 2017).

South Africa scored 57 in the Resource Governance Index. Scores that fall in the range 45 to 59 are categorized as "weak," and indicate that the country has both strong and problematic areas of governance. Countries with scores ranging between 60 to 74 are categorized as "satisfactory" for having strong governance procedures and practices in place, while countries with scores of 75 and above are considered "good" and have established laws and procedures that enable wealth from resource extraction to benefit citizens (Natural Resource Governance Institute, 2017). The scores and ranking of South Africa may improve in the Transparency International Corruption Perception Index, and in other indices as well, if the government of South Africa tackles the common factors which foster corruption in the public sectors and becomes a signatory of the Extractive Industries Transparency Initiative (EITI), which is the global standard for promoting the open and accountable management of oil, gas, and mineral resources.

Madagascar

Madagascar scores relatively poorly on the Transparency International Corruptions Perception Index. In 2002, the earliest year for which there is data for Madagascar, the country had a score of 17 out of 100. After the political crisis in 2002 when Ravalomanana was elected president, the country's transparency score improved to 31 (Global Corruption Index, 2018). However, since the more recent 2009 upheaval, the country's score has remained stagnant or decreased: Madagascar scored of 24 out of 100 in 2017.

In addition to the prevalence of corruption, public access to government information is limited in Madagascar. According to Freedom House, *Freedom in the World 2018* report, there is still no law in place that requires government information to be accessible to the public (Freedom House, 2018). The procedure for acquiring government information is informal and not effectively monitored. Press freedom is also lacking in Madagascar, contributing to the lack of accessibility to information. The most recent detailed "Freedom of the Press" report by Freedom House was its 2015 report, which gave Madagascar a "partly free" status with its press freedom (Freedom House, 2015). The report stated that while in the past there was violence against journalists, after the 2014 elections suppression of the press has decreased. However, there is a

lack of legislation in place that allows the public access to government information. Overall, Madagascar's governance environment is not conducive to the transparent regulation or oversight of the sapphire mining industry.

2.3 Corruption Prevention

South Africa

South Africa's overall score decreased slightly in the Global Competitiveness Index 2017-2018. However, its ranking compared to other countries has significantly improved: in 2016, it ranked 47 out of 138, while in 2017-2018, it ranked 61 out of 137. With its current ranking, South Africa is considered one of the most competitive countries in sub-Saharan Africa, but corruption remains the most problematic factor for doing business there (Schwab, 2017). In the 2018 Freedom House Index, *Freedom in the World* report, South Africa's score remains unchanged from previous years at two out of seven (where one represents "most free" and seven represents "least free" in terms of political rights, civil liberties, and freedom), and is considered a free state. Despite this, Freedom House highlights that the ruling party, ANC, lacks the political will to tackle corruption, as evidenced by the scandals of some of its members (Freedom House, 2018). However, media played a significant role in exposing some of these corruption scandals, such as the Gupta family corruption case as well as the case of the British firm, Bell Pottinger, trying to instigate the racial tension in South Africa (Freedom House, 2017).

The government of South Africa has developed and passed numerous laws, policies, and strategies for promoting good governance, accountability, and transparency. In 2015, South Africa planned to develop a National Anti-Corruption Strategy and establish an inter- departmental National Anti-Corruption Strategy Steering Committee to promote national dialogue about practical mechanisms to reduce corruption and improve ethical practices across sectors. This plan also aimed to develop a robust conceptual framework and strategic pillars to be used as an overarching guide for anti-corruption approaches across relevant sectors in South Africa (Corruption Watch, 2016).

Despite the existing frameworks for tackling corruption in South Africa, corruption is rampant in the public sector, including the school system. Some of the main reasons for the high rate of corruption in different sectors, including the mining industry, have been related to public

procurement irregularities, such as lengthy mining permit processes, which involve significant "red tape" and a number of departments. This has created room for corruption as government officers favor the processing of mining permits for friends and relatives, and demand bribes for processing the permits of strangers. According to South Africa's Citizen's Bribery Survey conducted by the Ethics Institute in 2017, 37% of survey respondents said that they knew someone who had been asked to pay a bribe, while 65% of respondents had paid bribes averaging about R 548 each, the equivalent of $40 USD (Dobie, 2017).

Madagascar

According to the Global Competitiveness Index from 2016-2017, corruption is the second most problematic factor for doing business in Madagascar (Schwab, 2016). At the same time, Freedom House's *Freedom in the World 2017* report assessed the country's freedom rating as three and a half out of seven (Freedom House, 2017). Freedom House further stated that corruption and lack of accountability are prevalent in the country and assigned Madagascar a five out of 12 rating for functional governance. To reduce corruption, Madagascar's government established a National Anti-Corruption Strategy that began in 2015 and will be implemented through 2025 (IMF, 2017). The plan is being overseen by the Independent Anti-Corruption Bureau (BIANCO), a body dedicated to improving governance in Madagascar. The plan aims to reduce corruption and create frameworks for handling anti-corruption cases. Additionally, the plan aims to ensure the Madagascar government meets their national legal framework requirements according to international standards. However, although the plan should have begun to have an effect after three years of implementation, according to Freedom House's *Freedom in the World 2018* report, corruption remains a problem in the country. The report further stated that BIANCO has initiated few investigations into cases of government corruption, and high-level officials remain secure from prosecution.

Corruption related to the mining sector is most visible within the distribution and regulation of mining licenses. "Rent-seeking" is a form of corruption prevalent in Madagascar's mining sector, in which officials will "demand payment for licenses" (Heyman, 2016). However, only the officials profit from the payment and the money is not returned to the Malagasy people. State officials are further involved in the politics of mining companies and profit from the industry via bribery.

Much of the corruption in the mining license process has been attributed to the government under the leadership of Ratsiraka. The Director of Mines and Geology in Madagascar stated that the previous government structures formulated under Ratsiraka enabled corruption in the mining licenses process, since Ratsiraka had control of the mining sectors and his political supporters benefited from gemstone mining (Duffy, 2007). The Director also argued that these problems endure, because those in the current government continue to rely on the same people who worked for Ratsiraka. This raises further challenges, as corruption between the government and the mining sector is becoming a pattern. While Ratsiraka's government established mechanisms to reinforce corruption, there has been limited progress in changing the frameworks set by Ratsiraka. In 2017, the Mining Code was set to be revised to improve gaps. However, the then- president Rajaonarimampianina announced that the government would make no changes to the existing Mining Code (Stoddard, 2017). Overall, corruption prevention in Madagascar's mining sector is still very weak, and stricter enforcement measures are necessary.

2.4 Industry Regulation

South Africa

In May 2009, former President Zuma divided the Department of Mineral Resources and Energy (DMRE) into two ministries: the DMR and the Department of Energy (DE), respectively. The mining industry is overseen by the DMR, which is led by the Minister of Mineral Resources who has a head office in Pretoria and nine regional offices throughout South Africa. Chapter 2, section 3 of the MPRDA gave custodianship of South Africa's mineral and petroleum resources to the Minister of Mineral Resources. According to the MPRDA, the Minister, on behalf of the state, has the right to "grant, issue, refuse, control, administer, and manage any reconnaissance permission, prospecting right, permission to remove, mining right, mining permit, retention permit, technical co-operation permit, reconnaissance permit, exploration right, and production right (MPRDA, 2002).

The Minister of Mineral Resources delegates his power to the Deputy General Director of the Mineral Regulation Branch, which administers rights for prospecting, mining, and compliance with the MPRDA, including environmental management. The Chief Directorates operating under the Mineral Regulation Branch are responsible for reviewing and processing the applications for mining permits within 30 days, as specified in the MPRDA. Within 14 days of acceptance of an

application for mining, the applicants are supposed to be notified that they should now submit an environmental and social impact assessments (ESIA) for approval. Once the ESIA is approved, the mining company must consult with interested and affected parties within 180 days of the date of approval. A comparison of the legally specified process and the actual process for approval of applications is shown in Figure 3 (Corruption Watch, 2017).

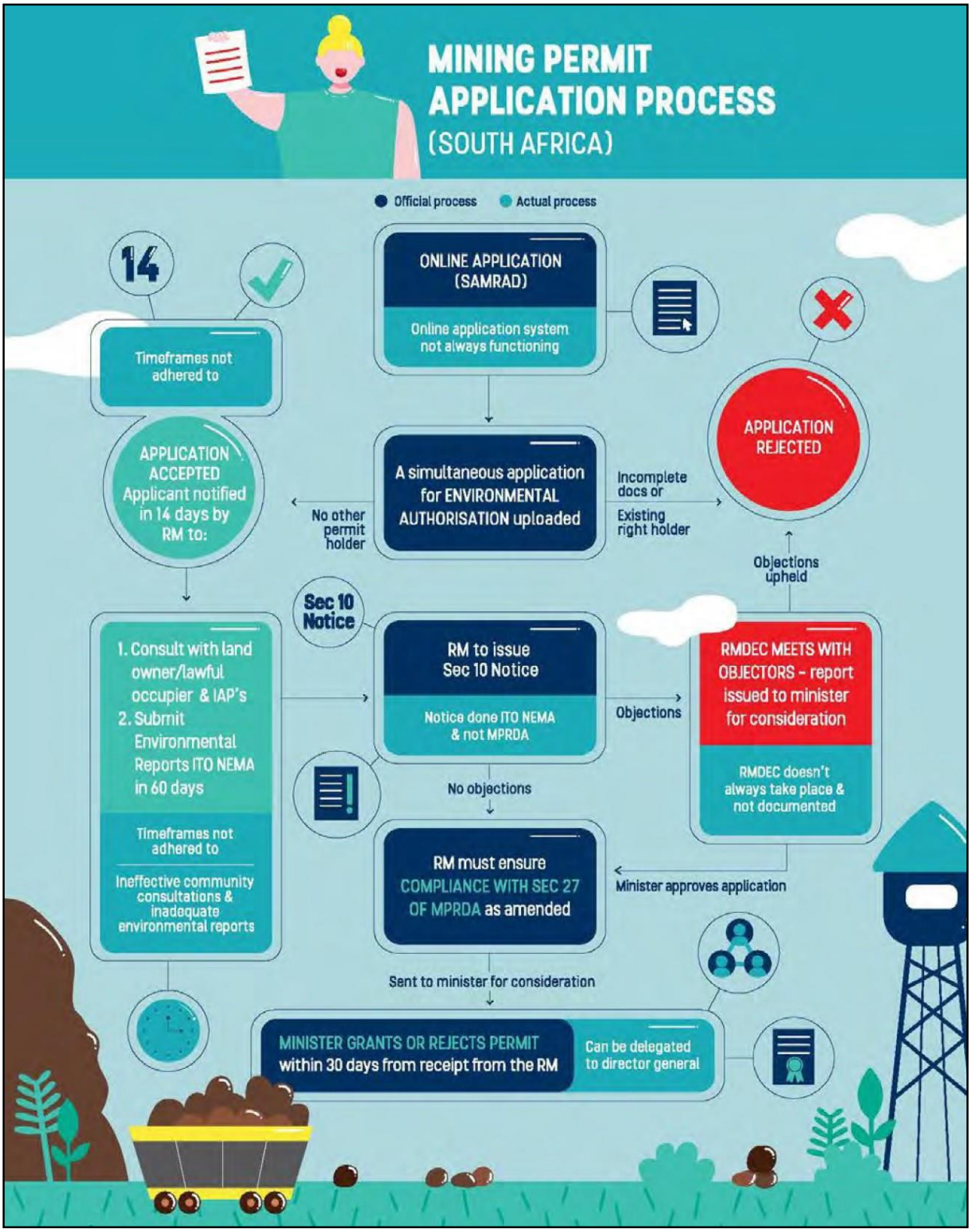


Figure 3. Applications Approval Process Diagram, Source: Corruption Watch, 2017. Retrieved from https://www.corruptionwatch.org.za/cw-report-chances-corruption-mining-approval-processes/

The DMR has established an online application portal, known as the South African Mineral Resources Administration System (SAMRAD) to reduce corruption, but this new system has been counter-effective and increased opportunities for corruption. DMR staff do not have the required knowledge and expertise to make informed decisions about the applications and some of them misuse the system. Since the implementation of this new online system, the DMR has not been able to process the applications for mining on time, increasing the number of backlogged applications, which remain pending for an average of six to 18 months. In other instances, four licenses were issued for the same mineral deposit. These problems have been attributed to exploitation of the online system by DMR staff and the inefficiency of the system in general (Corruption Watch, 2017).

In 2004, the government of South Africa introduced the Mining Charter to reflect the Broad- based Socio-Economic Empowerment Charter (BEE) in the mining industry. The Charter set nine targets for mining companies to achieve in five years, and has recently been revised and updated. The DMR has enforced the Mining Charter to promote equitable access and benefits to mineral resources for all South Africans, but especially for historically disadvantaged South Africans (HDSA), including women. The mining companies were required to meet the targets by providing skills development opportunities for HDSAs and women. According to the Charter, within five years, 40% of management positions in the mining companies should be held by HDSAs and 10% by women. Likewise, the mining companies were required to increase HDSA shares and ownership by 15% in five years, and 26% in 10 years (Mine Charter, 2004). However, in June 2017, the former Minister of Mineral Resources, Mosebenzi Zwane, introduced a new Mining Charter which further increased the economic opportunities for HDSAs and women by increasing the target goals: representation and shareholding of HDSA and women in mining companies must now meet the targets of 50% and 25%, respectively (PWC, 2017). However, many report that the Mining Charter has not made a meaningful contribution to the empowerment of HDSAs and women, and the fair redistribution of resources (Interviewee B, personal communication, November 9, 2018; Interviewee G, personal communication, November 11, 2018). Though the Charter has admirable goals, it has not effectively benefited the majority of HDSAs and women, but has only favored a small black elite taking over the ownership from whites (Corruption Watch, 2017).

States can control potential conflict of interests and promote accountability, integrity, and transparency in government through regulations of financial disclosure. This also increases citizens' trust and confidence in government institutions to allocate and spend the national income and tax-payers' money effectively and efficiently. According to the World Bank Survey, more than 150 countries have a financial disclosure requirement for their public officials (World Bank, 2016). The government of South Africa has also incorporated a financial disclosure framework in the Public Service Regulations of 2001, and the Code of Conduct for Assembly and Permanent Council Members, which subjects all elected officials, senior civil servants, and members of parliament including their spouses and dependent children to register and disclose all their assets, liabilities, and interests by 31 May each year (The Public Service Commission, 2008).

Beside domestic regulations for financial disclosure, South Africa has also ratified the United Nations Convention Against Corruption (UNCAC), which requires South Africa to enforce government officials' registration and disclosure of assets annually (Schulz-Herzenberg, 2009). Public officials and members of parliament have gradually increased compliance with the requirement to submit their financial disclosure forms. Only 10% of government officials submitted their disclosure forms in 2006-2007. The following year, 48% of government official submitted their forms, and the submission reached to 98% in 2016 (Public Service Commission, 2017). Although around 98% of public officials are submitting financial disclosure forms, they still do not fully comply with the financial disclosure regulation: some officials do not properly complete the forms or they intentionally delay submission. Moreover, most of them do not submit disclosure forms for their spouses or children. More importantly, the government of South Africa has not specified a unit or department to monitor and verify the disclosures of government officials (U.S. Department of State, 2017).

In 1996, DMR set up the Mine Health and Safety Council (MHSC) to manage and address the mining safety challenges. MHSC membership is comprised of state representatives, employers, and organized labor operating under the Chief Inspector of Mines. MHSC provides advice to the Minister of Mineral Resources on occupational health and safety legislation and measures, and reports directly to Parliament (Chamber of Mines South Africa, 2017).

Madagascar

Madagascar's Mining Code has established the formal regulations and requirements that miners are legally required to adhere to. If followed, these laws would improve the country's economic growth and reduce the negative impacts of mining, especially on the environment. Though the Mining Code was established in 1999, the government has since faced challenges in enforcing regulations. Most sapphires in Madagascar are mined informally, out of government's reach (Collins and Lawson, 2014). Within the Ministry of Mines, there is a department dedicated to LSM, but no similar department exists for ASM. This is problematic, because of the number of miners who engage in small-scale mining in Madagascar, and the impact this kind of mining has on the environment (Crawford, 2015).

The difficulty in obtaining proper licenses contributes to the lack of regulation and oversight: there is no incentive in place for miners to operate legally (Baker-Médard, 2012). Permits are difficult to acquire and the process can be difficult to navigate. The process to obtain a permit includes receiving a series of invoices and stamps by going through multiple government offices (Interviewee K, personal communication, November 19, 2018). Mining permits are also expensive due to the various fees, such as license fees, transaction costs, and taxes, included in the permit process (Crawford, 2015). For small-scale artisanal miners, the costs of obtaining a license outweigh the benefits, disincentivizing miners to obtain formal licenses. Since many artisanal miners do not mine with a license, it is difficult for the government to regulate mining, especially in remote areas where the landscape is densely forested and difficult to access for monitoring. Many sapphire-rich areas have also been formally protected by regulations established by the government, beginning in the 1990s. Since permits over these conservation areas cannot be obtained at all, these areas are frequently subject to illegal mining.

In addition to the difficulties of obtaining a mining permit, the pattern of mining rushes is a cause of regulatory and enforcement problems for the government. Mining rushes for sapphires occur every several years. One of the most recent rushes occurred in 2016, and miners went to Didy, a town in eastern Madagascar, to mine for sapphires (Lempriere, 2018). During this rush, the Gemological Institute of America estimated that around 50,000 unlicensed miners came to Didy to mine for sapphires (Monks, 2017). Due to the lack of predictability of the time and place of the rushes, it is difficult for the government to prepare and enforce its regulations on miners.

During an earlier sapphire rush that occurred in 2012 in Didy, a local Malagasy paper stated that the government removed miners from protected areas and issued several arrests (Pardieu & Rakotosaona, 2012). However, there is limited evidence of the government actively expelling illegal sapphire mining from protected areas. Furthermore, mining rushes often occur in small towns or dense forests. While the government has attempted to increase law enforcement during mining rushes, these attempts have been hindered by the dense forests and the inconsistency of rushes (Pardieu & Rakotosaona, 2012).

2.5 Presence of Criminal Non-State Actors and Organizations

South Africa

The presence of illegal miners and organized criminal groups are on rise in South Africa. The rise in illegal mining is attributed to a combination of socio-economic factors, such as a high rate of unemployment, poverty, weak law enforcement, and influx of illegal immigrants in South Africa. Illegal mining is considered a lucrative option not only for unemployed South Africans, but also for illegal immigrants coming from Zimbabwe, Mozambique, and Lesotho (PWC, 2017). Illegal miners and organized criminal groups are interrelated, since illegal miners are usually heavily armed and carry explosives when they trespass on the mining sites. They often target the security personnel that patrol the mining sites. “Zama zamas” is the term used in South Africa to refer to these illegal miners. The illegal miners enter abandoned mining sites and travel several miles to reach a safe area to operate underground and extract platinum or other precious minerals for an extended period of time. Proper safety measures and adequate supplies of food and water are almost never taken. Instead, the miners are dependent on food and water transferred to them by legal miners in return for large amounts of cash (South Africa Mineral Council, n.d.).

Approximately 14,000 illegal miners are operating in South Africa. These miners are connected with international operators and international criminal groups, who smuggle the natural resources to other countries. The government of South Africa strives to address the prevalence of illegal miners and organized criminal groups not only because of the economic implications, but also because it poses security challenges to the sovereignty of the country. Security challenges include human trafficking, money laundering, and other transnationally organized crimes (The Federation for a Sustainable Environment, 2018).

In the industry value chain, the illegal miners operate at the lowest value adding level, working in extremely risky conditions to extract natural resources. The majority of benefits go to other actors operating at higher tiers of the value chain, usually the bosses of nationally and internationally organized criminal syndicates (South Africa Mineral Council, 2018). Since most illegal miners are poor and desperate for money, they are employed by the organized criminal groups to extract platinum for them. Though illegal miners are not forced to work for organized criminal groups, they often have little economic choice but to accept this modern form of slavery. According to the Global Slavery Index 2017, South Africa scored 53.7 out of 100, where zero represents very low vulnerability and 100 represents very high vulnerability to modern slavery: approximately 2.8 individuals per 1,000 are living in modern slavery in South Africa (The Global Slavery Index, 2017).

The government of South Africa established two specialized branches to eradicate organized crime including illegal mining: the Organized Crime Branch, and the Serious and Violent Crime Branch. Around 600 detectives are working throughout the country to prevent organized crime (The Federation for a Sustainable Environment, 2018). In June 2018, the DMR started providing mining permits to thousands of illegal miners in order to incentivize them to switch to legal mining. However, it is not known whether the illegal miners will join the licit mining industry, since this requires payment of permit fees and taxes (Sibongile Kumalo, 2018). Through the United Nations Office on Drugs and Crime, South Africa has also had dialogues with Russia, Zimbabwe, Namibia, Ghana, Belarus, and Colombia to develop a comprehensive strategy to combat transnational organized crime, including illegal mining (South Africa Mineral Council, 2018). Yet, some high government officials in South Africa do not have the political will to abolish illegal mining, because they are directly or indirectly benefiting from it (The Federation for a Sustainable Environment, 2018).

Madagascar

There have been reports of criminal networks that have control over the sapphire trade in Madagascar, particularly in rural mining areas, such as in Ilakaka (Duffy, 2007). However, the presence and influence of the criminal networks is disputed among experts in the field (Interviewee A, personal communication, November 6, 2018).

Chapter 3: Economic Challenges

This section will detail the economic impact of jewelry production, specifically of sapphires and platinum, on the national economies of Madagascar and South Africa. As a general trend, both countries benefit the most from the mining and refining industries of their respective precious commodities, but have weak levels of beneficiation. Precious commodities make up a significant percentage of both countries' gross domestic products (GDP), and contribute to the overall health of the economies. At the same time, reliance on finite resources can be a risky economic strategy, and illegal mining and export can provide funding for transnational crime syndicates or terrorist groups.

Larkin, Jason.(Photographer). 2014. Platinum Mine in Rustenburg.

3.1 Industry Employment

South Africa

Since the discovery of platinum in South Africa in 1924, the mineral has held an important place in the country's economy (Platinum-Minerals Council South Africa, 2018). As of 2017-2018, the whole mining industry, including gold, iron, and coal, accounted for 7-8 percent of the total GDP of South Africa (Statistics South Africa, 2018). Of that 7-8 percent, platinum is contributing to about 21% of the total sales for minerals, translating to roughly 1.47 percent of the total GDP of South Africa (Statistics South Africa, 2018). South Africa is the source of 96% of the world supply of platinum (Federation for a Sustainable Environment, 2018).

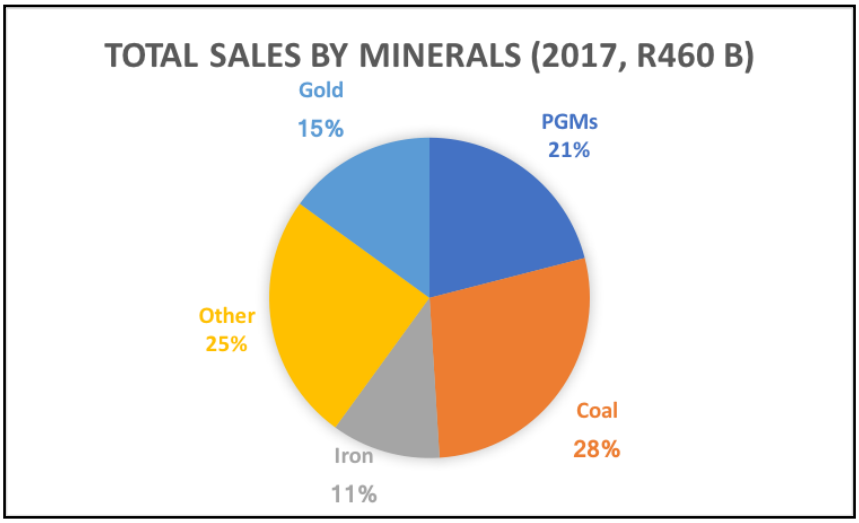


Figure 4. South Africa's Total Mineral Sales
Data from Statistics South Africa 2017-2018.

Globally, nearly 30% of platinum demand is generated by the jewelry industry, and 40% by the automotive industry. Of the entire global, yearly consumption of platinum in 2017, Europe (29%) and China (24%) were the heaviest consumers. Overall, the global demand for platinum for jewelry has declined by 25% from 2013 to 2018 (Statista, 2018).

According to the South Africa Chamber of Mines, 175,770 people are directly employed in the platinum mining industry in South Africa, earning approximately R48 billion (USD $3,440,112,000) each year (Interviewee B, personal communication, November 9, 2018.); there are also many jobs created on the secondary and tertiary levels of platinum mining, refinement,

and export. Indirectly, the entire mining sector employs about 500,000 people (Federation for a Sustainable Environment, 2018).

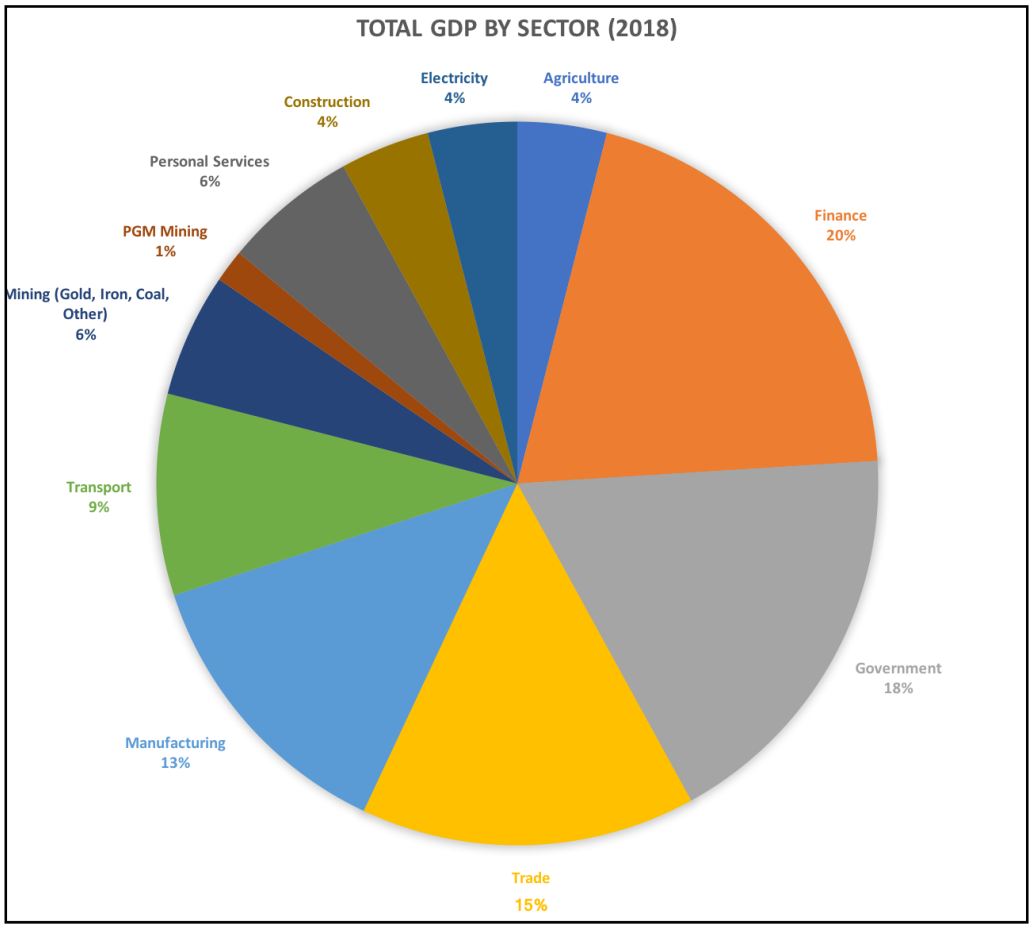


Figure 5. South Africa's Total GDP by Sector.
Data from The World Factbook (n.d.) and Statistics South Africa 2017-2018

Overall, the total number of direct and indirect employees represents less than 5 percent of the total South African labor force (South Africa Labor Force Participation Rate, 2018). Wages paid to those directly employed account for 40% of the total expenditures spent in the mining industry, and "mine wages are now among the highest in the country" (Federation for a Sustainable Environment, 2018).

Madagascar

Madagascar's economy is heavily reliant upon trade, which makes up 74.45% of its total GDP, with the trade deficit steadily decreasing since its peak during the period before and immediately

following the coup from 2008 to 2009 (World Bank, 2018; Statistica, 2018). Exports make up 35.42% of the country's GDP, with precious stones comprising 1.6 percent of exports in 2016, valued at $46.1 million USD (OED, 2016). In reality, this figure is almost certainly much higher, given the proportion of the industry that is comprised of ASM, which is highly informal and unregulated in nature. On a broader scale, Madagascar's GDP is primarily dominated by agriculture, with mining, including chromium, nickel, cobalt, ilmenite, zirzill, coal, iron ore, zircon, gold, and precious gems, only contributing an estimated 3 percent to the economy (Center for Social Responsibility in Mining, 2015; OEC, 2018).

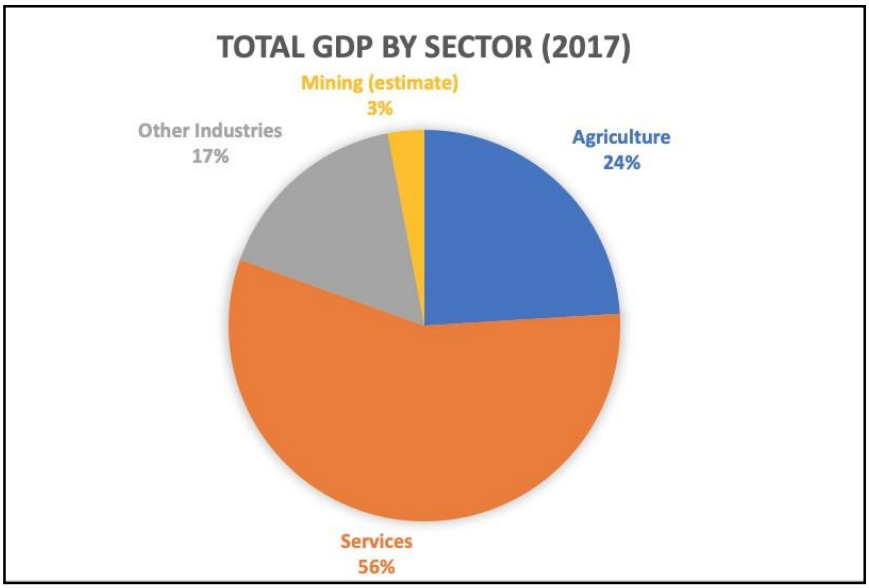


Figure 6. Composition of Madagascar's GDP by Sector.
Data from Center for Social Responsible Mining (2015) and OEC (2018)

This section, in part, will discuss why the sapphire mining industry in Madagascar is structured in this way, and the challenges it can pose.

There have been attempts to formalize the industry through either medium-scale mining (MSM) or LSM, with varying degrees of success. Given the major investment that it demands, it is not uncommon for colored gemstone industries to lack LSM operations, due to the historical inconsistencies in the global supply and demand of colored gems. In Madagascar's case, multiple factors have contributed to the predominance of ASM in the sapphire industry. Political instability, such as the presidential crises of 2002 and 2009, has likely had an effect on the development of LSM of sapphires on the island. More practically, the difficulty of importing

industrial equipment, made more expensive by bribes frequently demanded by customs officials, has made the cost of doing business in the Malagasy sapphire industry too high for LSM companies (Interviewee C, personal communication, November 13, 2018). This is further compounded by the fact that a majority of the known sapphire deposits are alluvial and can be easily mined without the mechanization of LSM (Cartier, 2009).

However, our research did uncover two companies in Madagascar associated with what would be considered large-scale mining of sapphires and other gems. The first is KAT Sapphires Ltd. KAT claims to control 1,300 square kilometers of mining concessions and operations, but owns a Mauritius-based workshop and laboratory to process the stones. On their website, the company claims to respect and adhere to the Mining Code and its environmental obligations, while also striving to advance local communities. KAT hires locally and purchases all products needed for mining from local businesses. For development of their employees, KAT claims to provide education and safety classes and provides mechanized mining equipment (KAT Sapphires, 2018). It is not known how many Malagasy KAT has employed or even if it is still operational. There is the possibility the company stopped operations due to their inability to export sapphires from Madagascar (Interviewee J, personal communication, November 20, 2018). In the course of our research, we reached out to KAT multiple times, but received no response.

Another potential company to soon engage in LSM of sapphires in Madagascar is Gemfields. There are reports that Gemfields owns land in Madagascar, but per their website's description of the local projects, the company is currently in the exploration stage (Interviewee J, personal communication, November 20, 2018). Gemfields claims to own Oriental Mining SARL, a company incorporated in Madagascar. It currently has 15 exploration licenses, pending transfer approval of five more, which includes other gemstones as well in the Antananarivo, Fianarantsoa, and Toliara provinces. This company could provide significant economic benefits and formalization to the sapphire industry in the future (Gemfields, n.d.).

On an individual level of industry employment, many people leave traditional occupations, such as farming and herding cattle, to pursue economic opportunity in the sapphire fields. The unregulated nature of this industry, often described as the "Wild West," has a direct effect on the quantity and quality of formal jobs available in sapphire mining. Many work independently in artisanal mining, characterized by its lack of mechanization and official permitting, while others

participate in small-scale mining, which typically involves some mechanization and often a legal mining claim (Cartier, 2009). A unique example of quasi-formalized, small-scale mining can be found in the perhaps best known sapphire mining sites in Ilakaka. There, a claim holder will hire miners for a daily wage of a few dollars and eventually give them a portion of the money from the sapphires sold. While this arrangement may not seem very lucrative by Western standards, it offers a comparable and, most importantly, guaranteed wage for miners (Interviewee A, personal communication, November 6, 2018). Furthermore, the combined effort of these men is cheaper and as, if not more, efficient than employing industrial excavation equipment (Interviewee H, personal communication, November 8, 2018). The lack of barriers to entry has allowed many Malagasy to find employment in sapphire mining. However, the industry's largely informal nature has also meant that a majority of these miners have gone uncounted, both depriving them of potential protections and services and the government of potential revenue from taxation.

Exact numbers concerning people formally and informally employed by the sapphire mining industry in Madagascar are not available. Estimates place the number of full-time and seasonal artisanal miners at approximately half a million people. However, some of these individuals may be mining for alluvial materials other than sapphires (World Bank, n.d.). As referenced in Chapter 2, sapphire mining on the island has generally occurred in "rushes," in which areas are inundated with prospective miners when new gemstone deposits are discovered and populations can balloon. While it is possible in theory to gauge the number of artisanal miners based on individual mining permits issued by the government, there have been many reasons why individuals forego this process, such as cost, the complication of the permitting process, and simply lack of faith or trust in institutions. At present, the government has placed a hold on all new permits in an attempt to control the growth of the industry, but this is likely to increase the number of people mining informally. Even more difficult to measure is the population that is employed in the host of secondary industries that crop up to provide goods and services to miners, however estimates run around one million (Interviewee A, personal communication, November 6, 2018). Given that the total workforce in Madagascar hovers at just above 13 million, these estimates demonstrate the considerable weight of the sapphire industry in the Malagasy economy (World Bank, n.d.).

Smith, Toby (Photographer). 2013. Ilakaka. A group of day-laborers form a human conveyor belt to extract gravel that will be sifted for precious gems. [digital image]. Retrieved from https://www.tobysmith.com/project/madagascar-illegal-sapphire-mining/

During a 2017 rush in the eastern part of the country, the small rainforest village of Bemainty saw an influx of as many as 200,000 miners alone, according to estimates from local authorities (Sapphire Rush Threatens Rainforests, 2017). In many ways, these population swells boost local economies and provide new opportunities for employment. However, the boost is only temporary, lasting as long as the supply of sapphires in the ground, and therefore threatens to destabilize boomtowns once the miners move on to new dig sites.

3.2 Fiscal Sustainability

South Africa

Global demand for platinum has been falling in the last several years, and, as a result, many of the industry giants have announced plans to significantly cut their workforces and have already closed the operation of some of their mining shafts (Platinum Mines in SA, 2018). This is

partially the result of falling platinum prices, which in turn were affected by an oversupply of platinum above ground relative to falling demand in the last five years.

Larkin, Jason.(Photographer). 2014. Platinum Mine in Rustenburg.
Copyright of Jason Larkin from album "Tremors Below." Used with Permission.

Many business journals are forecasting a decrease in foreign direct investment (FDI) in platinum mining in South Africa and a shrinking of the industry as a whole (Platinum Mines in SA, 2018). This is relative to R94 billion (USD $6,724,243,000) in total platinum sales in 2017, of which 87% was exported and for which R0.08 billion was paid in taxes to the South African government (South Africa Chamber of Mines, 2018). This decrease in industry size could potentially be mitigated by new uses being developed for platinum, such as new fuel cell technology (MISTRA, 2013; Interviewee G, personal communication, November 11, 2018).

While platinum is a finite resource, it is also possible to recycle used platinum. According to a publication by MISTRA (2013), the Mapungubwe Institute for Strategic Reflection, the recycling of platinum and platinum group metals (PGMs) "is regarded as one of the most strategic and quickest means to escape dependency on South Africa and mitigate the impact

of price volatility characteristic of commodity markets." While this bodes well for purchasers and consumers of platinum, it implies South Africa's eventual loss of significant financial resources via employment, taxation, and export from the platinum industry.

Madagascar

Like most natural resources, the sapphire deposits of Madagascar have taken thousands of years to reach modern day levels and are being extracted at a faster rate than ever before. Sri Lanka, home to a much older and better known sapphire industry, has banned LSM so as to preserve not only its gem deposits, but also the livelihoods of those who have artisanally mined the island's sapphires for generations (The Natural Sapphire Co, 2018; Interviewee C, personal communication, November 13, 2018). While Madagascar has yet to take such a drastic step, it may be a consideration in the future as Malagasy jobs are replaced by mechanization or, though less likely, sapphire supply begins to dwindle. That being said, there is no indication from our research that either of these scenarios are a concern for the foreseeable future.

The greater threat to ensuring the fiscal sustainability of the sapphire industry is the Malagasy government's inability to effectively regulate and levy taxes. The wealth generated from this valuable national resource will be drained by corrupt officials, foreign traders, and multinational corporations if the government does not begin to process mining permits once more and collect the 2 percent royalty that is stipulated by law (Mining Code, 2005). Madagascar, like so many postcolonial countries, suffers from the "resource curse," and needs to be able to retain some profits from sapphire mining and reinvest them into public infrastructure and institutions if the industry is to be truly sustainable.

3.3 Beneficiation

South Africa

The beneficiation of minerals such as platinum can be generally divided into three categories of value adding activity: (1) "large scale capital intensive, e.g., ore smelting;" (2) "sophisticated -- typically embodying 'high' technologies and skills (stainless steel, auto catalytic converters);" (3) "labour-intensive (craft jewellery, metal fabrication, ceramic pottery)" ("South Africa: Pressure grows for beneficiation rules," 2012). The diversification of the South African economy via

mineral beneficiation strategies has been a goal and discussion of policy makers for decades, without producing significant results in more than a few areas.

In June 2011, the South African Department of Mineral Resources published a report entitled "A Beneficiation Strategy for Minerals Industries in South Africa," which aimed to lay a framework through which the government would work together with mining companies to increase the amount of finished products which South Africa could export. This strategy lays out the specific challenges each mineral industry faces in terms of developing local beneficiation, and the corresponding plan of action. For the PGMs, the development of beneficiation was primarily directed towards local production of catalytic converters; the report stated that "Although the fabrication of platinum jewellery is not a priority area for platinum group metals (PGM) beneficiation, the integration of specialised platinum jewellery facilities into any of the jewellery hubs would be well received (South Africa Department of Mineral Resources, 2011)." Diamond and gold beneficiation was also included as part of the 2011 strategy, and the report made several proposals for developing jewelry beneficiation in South Africa for these three minerals:

- Ensure local access to the minerals;
- Invest in jewelers' training programs;
- Promote investment in the jewelry industry;
- Support private sector initiatives.

Since the report was issued, South Africa has become the world's leading manufacturer of autocatalytic converters ("South Africa: Pressure grows," 2012), and invested in a flagship project for the production of hydrogen powered fuel cells called "Hydrogen South Africa" ("South Africa mining industry prepared," 2018). However, South Africa has struggled to develop beneficiation for all sectors, seemingly because many of the same challenges which were identified in the 2011 report continue to thwart beneficiation efforts. These challenges include

- Local access to raw materials as a result of global pricing mechanisms and mining industry structures;
- Infrastructural bottlenecks;

- Shortage of highly skilled labor;
- Market access as a result of high tariffs for finished products.

However, South Africa's difficulty in developing local downstream value-adding activities from its export industry is not surprising given that according to a policy paper issued by the Harvard Center for International Development in 2008, for both developed and developing countries such a transition is extremely rare (Hausmann et al., 2008). In addition to this, the authors argue that

> policies to promote greater downstream processing as an export promotion policy are misguided. Structural transformation favors sectors with similar technological requirements, factor intensities, and other requisite capabilities, not products connected in production chains. There is no reason for countries like South Africa to focus attention on beneficiation at the expense of policies that would allow other export sectors to emerge. This makes no sense conceptually, and is completely inconsistent with international experience. Quite simply, beneficiation is a bad policy paradigm. (Hausmann et al. 2008)

Essentially, the globalization of trade might make it near impossible for South Africa to successfully develop and *compete* in labor intensive value adding activities, such as craft jewelry production. In addition, though many mining companies have prospected the idea of creating beneficiation, many have foregone investment because the current price of global platinum would not generate a sufficient return on investment (Interviewee B, personal communication, November 9, 2018).

Madagascar

Despite efforts from early on in the growth of the sapphire mining sector, a majority of the gemstones extracted from Malagasy soil are exported or more often smuggled to countries such as Sri Lanka or Thailand for beneficiation. In many cases, these places are the home to older gemstone mining industries, which have developed highly specialized capacities in gem-cutting and chemical and heat treatment. The Gemological Institute of Madagascar (IGM), an agency within the Ministry of Mines, was established in 2003 by the Malagasy government and the World Bank as part of the "Project on the Management of Mineral Resources." As a means of developing a domestic gemstone beneficiation sector, the IGM provides training in gemology

and lapidary skills such as stone cutting and polishing. These services are not free, however, which serves as a barrier for the average Malagasy living in poverty (IGM, 2018).

After a high-profile smuggling scandal in 2008, the Malagasy government issued a moratorium on the export of all gemstones. This was soon downgraded to a ban on the export of rough gemstones. Finally in 2009, the ban was lifted completely and rough sapphires could once again be exported for beneficiation (Thomas, 2012). In theory, a measure such as halting the export of rough stones would have been intended to encourage domestic beneficiation by requiring some value addition before traders could access the international market, but this is infeasible in Madagascar for multiple reasons. First, the Malagasy sapphire industry lacks the expertise and equipment for any significant beneficiation, and there is little incentive for private investment in this sector because it can be done better and more cheaply elsewhere. Second, there is very little enforcement capacity in Madagascar, so instead of achieving the desired effect of increasing beneficiation, it has only encouraged traders to smuggle their stones to the market (Interviewee A, personal communication, November 6, 2018; Interviewee C, personal communication, November 13, 2018).

3.4 Smuggling and the Informal Economy

South Africa

Illegal ASM in South Africa represents an import economic force. As stated in Chapter 2, around 14,000 miners work illegally in South Africa, mining for gold, diamonds, and platinum in shafts abandoned by legal mining companies. Illegal mining groups tend to be highly organized, and connected to international criminal syndicates, racking up precious metal sales of an estimated R7.0 billion (USD $500,741,500) each year ("Illegal mining on the rise," 2016). This transnational criminal market is estimated to be organized according to five tiers:

1. First tier: underground, physical miners, usually immigrants;
2. Second tier: buyers above ground who organize the first tier, providing them with food, protection, and equipment;
3. Third tier: regional bulk buyer, usually with legal permits for buying precious metals;
4. Fourth tier: national and international distributors, may use legitimate or non-legitimate export companies;

5. Fifth tier: top international receivers and distributors. (“Illegal mining on the rise,” 2016)

Many problems arise from illegal mining. First, the safety of the physical miners is often at risk, and many die. Second, the methods of refinement used are often much more ecologically damaging than legal methods. Third, potential revenue is lost for both legal mining companies, legal mining employees, and the state in the form of taxes. Fourth, illegal mining has led to increases in crime in certain communities, e.g., violence, child labor, and bribery. (“Illegal mining on the rise,” 2016).

Madagascar

The large majority of the sapphire trade in Madagascar is carried out informally, with both Malagasy and foreign traders smuggling predominantly raw stones out of the country. As previously mentioned, there are many reasons for this, primarily barriers to trade put in place by the government (Interviewee C, personal communication, November 13, 2018). Such barriers could be import and export tariffs, or, as has been the case in Madagascar, bans on exports and a moratorium on mining permits. It goes without saying that some would wish to engage in illegal activity no matter what, but there is often no other way to conduct business. The vast majority of Malagasy who participate in smuggling do so because they have no other economic choice. Sources estimate that $150 million USD worth of sapphires leave the country illegally each year, but the lack of regulation impedes officials or outsiders from recording exact numbers (Lempriere, 2018). By not formalizing this trade, the government forfeits the potential revenue from the industry and the ability to accurately track its size and performance.

A lesser considered, but consequential effect of the informal nature of Madagascar’s sapphire industry is the erasure of the stones’ origins. Many of the stones that are mined in Madagascar are of equal or greater quality than those from Sri Lanka or Burma, however lack the provenance which makes sapphires from these other countries many times more valuable. This gives traders a huge financial incentive to lie about the actual origin of the gemstones. With no tracking of sapphires once they leave the country, there is no effective way of challenging fraudulent claims, especially given the fact that a Malagasy sapphire can be made to look identical in characteristics to one from Sri Lanka with the highly sophisticated beneficiation methods available today. This practice has a long-term impact on the brand of the Malagasy sapphire industry, preventing it

from gaining notoriety and value (Interviewee C, personal communication, November 13, 2018; Interviewee H, personal communication, November 8, 2018).

3.5 Non-State Actor and Terrorist Funding

South Africa

Because of the nature of the illegal mining structures in South Africa, they are prone to control by national and transnational crime organizations and syndicates, as well as terrorist organizations. Both organized crime and terrorist organizations are able to use illegal mining as a profitable investment for funds they have accrued through other illegal activities, such as drug production and trafficking. Organized crime and terrorist organizations frequently operate in the second, third, and fourth tiers of the illegal mining economy (Project Yield-UNODC, 2018). Additionally, according to journalist Laura Oneale,

> South Africa is a favored destination for organized crime and the wheels of justice turn too slowly to adequately deal with the high volume of illegal and organized crime. The weak border controls, secondary airports and developed transportation system within South Africa is a prime target of rising crime (2014).

The attractiveness of South Africa to organized crime and terrorist organizations seems to be on the rise: South Africa has risen from scoring a 1.68 on the Global Terrorism Index in 2008 to a 4.092 2017 (scores are rated from 1 to 10, where 1 is a low level of terrorism activities and impact, and 10 is the highest level) (South Africa Terrorism Index, 2017). Lawlessness, government corruption, and the inability of government police forces to effectively coordinate with international bodies to apprehend persons that operate in the second tier and above contribute to this rise. Specifically, organizations that have been named or are suspected of operating funding activities in South Africa via illegal gold and platinum mining include the following: Al Shabab, Al Qaeda, Hezbollah, Boko Haram, Al Aqsa Foundation, and some South African transnational crime organizations, such as the Mountain Boys (Project Yield-UNODC 2018; Benjamin, 2015).

Notably, platinum and other PGMs are easier to illegally export than other precious minerals, such as gold or diamonds. Because platinum in its raw form is not widely recognized, crime organizations have found this particular metal easier to export by labelling packaging with

fraudulent papers: customs officers often are not able to recognize the raw platinum for what it is, and so the metal is passed across borders unnoticed, sold to fronting companies or unsuspecting (but legal) South African companies to make the product look legitimate, and then sold to international buyers (Project Yield-UNODC, 2018).

Madagascar

Madagascar has risen from scoring a 1.93 on the Global Terrorism Index in 2009 to a 3.287 in 2017 (Global Terrorism Index, n.d.). This indicates an increased level of terrorist incidents in Madagascar over the last eight years, but falls just above the index's categorization of "lowest impact of terrorism" compared to other countries. It is possible that this rise correlates with a general trend towards increased terrorist events globally following the rise of the terrorist organization known as the Islamic State of Iraq and the Levant (ISIL). However, our research uncovered no information suggesting that the Malagasy sapphire industry profits any terrorist or criminal non-state actors or is connected to this rise in incidents in any way.

Chapter 4: Environmental Challenges

This chapter investigates the risks to environment posed by platinum industries in South Africa and sapphire industries in Madagascar. Both South Africa and Madagascar are highly biodiverse, and industry mining sites often overlap with these biodiverse areas. While the South African and Malagasy governments have each established environmental regulations for their respective mining industries, in both cases there is inefficient oversight, leading to environmental damage that affects the livelihoods and safety of citizens, particularly those living in proximity to mining sites.

Larkin, Jason.(Photographer). 2014. Platinum Mine in Rustenburg.

4.1 Environmental Sustainability

South Africa

On a broad level, South Africa ranks 142 out of 180 countries for its overall environmental performance according to the Environmental Performance Index (EPI). Yet, it ranks only 157 out of 180 countries for its environmental health. Platinum mining in South Africa, like most types of mining, has resulted in collateral damage to the environment, and subsequently to the health of people living near mines. Mining can lead to loss of water resources, agricultural land, and significant amounts of biodiversity, all of which communities rely on for their livelihoods. Solid waste production, massive water and energy consumption, and sulphur dioxide emissions are the primary impacts of platinum mining.

Different phases of platinum and PGM mining and refinement cause different kinds of environmental damage. In the process of extraction, whether above ground or below ground, blasting operations create noise, dust, and ground vibrations. In the rock crushing and milling phase, a large amount of dust is created and high levels of energy are consumed. The flotation and drying phase, when the PGM concentrate is produced, also requires a large amount of water and energy, resulting in dust and water pollution, and the depositing of fine rock slurry and chemicals into slime dams. During the final phase of smelting, where the PGMs are separated from waste and then again from other minerals, the air is polluted with dust and sulfur dioxide. Additionally, high levels of energy are consumed by electric arc furnaces, electrowinning, as well as the use of coal. These phases and the corresponding environmental impacts are shown in Figure 7, adapted from the work of researcher Eugene Cairncross (2014).

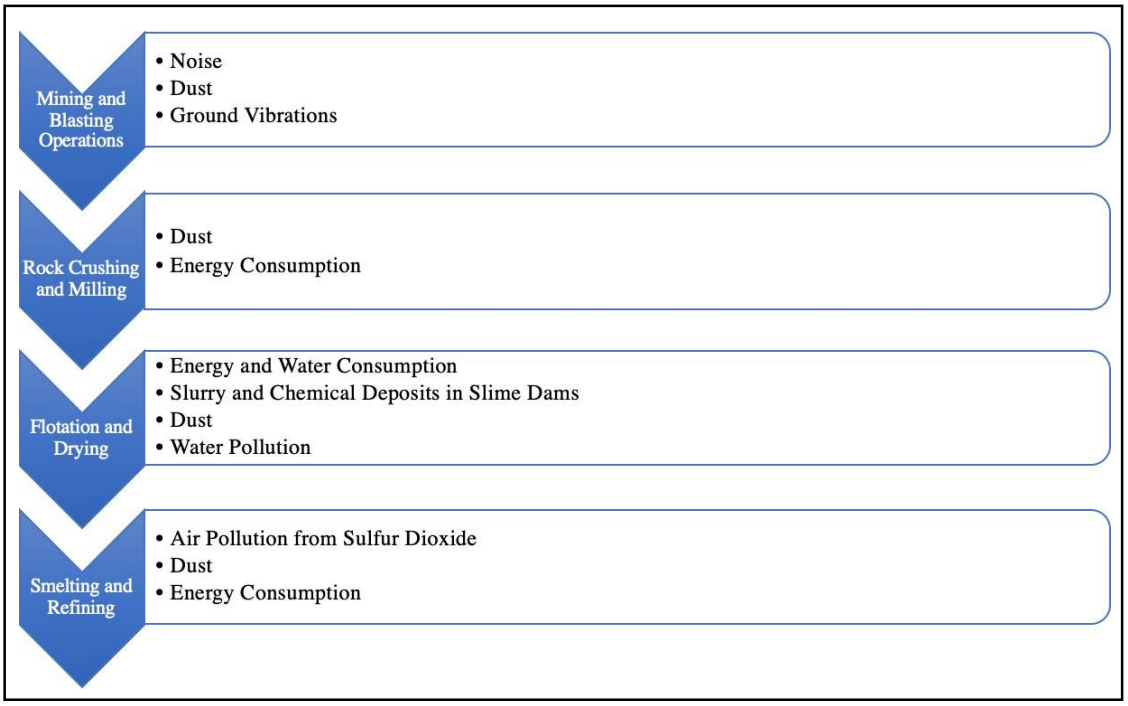


Figure 7. Environmental Results of Platinum Mining
Adapted from: "Health and environmental impacts of platinum mining: Report from South Africa," E. Cairncross, 2014. Retrieved from http://www.thejournalist.org.za/wp-content/uploads/2014/09/Environmental-health-impacts-of-platinum-mining1.pdf

Mining in Sensitive and Protected Areas

South Africa is the third most biodiverse country in the world (Department of Environmental Affairs, 1998). The Mpumalanga province, although occupying only 6 percent of South Africa, contains 21% of South Africa's plant species. About 5 percent of its vegetation types are categorized as threatened because of prospecting and mining (Mpumalanga Tourism, 2014). Moreover, 54.2% of land-use in the Mpumalanga province has been subject to prospecting applications, and 24.5% has been utilized for mining (Mpumalanga Economic Growth and Development Plan, 2011). Mining has permeated the region, which in addition to its biodiversity, harbors large deposits gold, platinum, coal, and ferrochrome.

Overall, mining in South Africa is a cause for concern, as insufficient legal protection exists for environmentally strategic or sensitive areas. According to the National Environmental Management: Protected Areas Act, 57 of 2003, Section 48 restricts mining in:

a. Special nature reserves, national park or nature reserve; or

b. Protected environment except if there is written permission from the Minister of Environmental Affairs (DEA) and the Minister of Mineral Resources; or

c. Protected areas that are world heritage sites, marine protected areas, and protected forest areas, forest nature reserves, and areas that have been declared forest wilderness areas by the National Forests Act, 1998 (Act. No. 84 of Parliament of the Republic of South Africa, 1998).

Nonetheless, mining licenses are granted by the Department of Environmental Affairs (DEA) and the DMR. There has been a high priority placed on immediate economic benefits, rather than environmental protection of the threatened ecosystems. The National Protected Areas Expansion Strategy was put in place in 2008 by the government of South Africa to expand protected areas for ecological sustainability and resilience to climate change ("National Protected Area Expansion," 2008). The Mining and Biodiversity Guideline comprises maps of areas that are of high significance for biodiversity, but which are also at high risk of being mined, as shown in Figures 8 and 9.

The DEA and DMR have set a concerning precedent in allowing prospecting and mining in biodiversity-rich areas (Hadebe, 2017). Some examples of mining in these protected areas include Barberton gold mining in the Barberton Nature Reserve in the Mpumalanga Province, and Atha-Africa Ventures, a coal mining operation in Mabola region, which is part of the Mabola Protected Environment. If PGMs are found in biodiversity-rich areas, then there is a high likelihood that the DEA and DMR will allow mining, despite potential environmental consequences. Presently, platinum mines exist in areas that are considered critically endangered, endangered, and vulnerable, and there have been no steps taken by the DEA or DMR to further protect them.

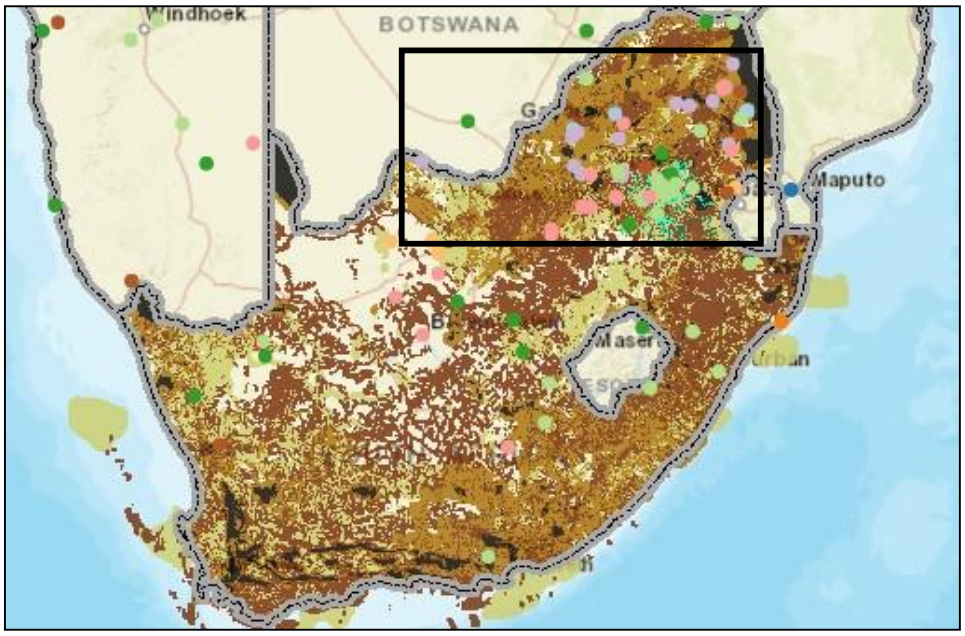


Figure 8: Biodiversity-Rich Areas with Mines
Source: South African National Biodiversity Institute (2018). Retrieved from http://bgisviewer.sanbi.org/Html5Viewer/Index.html?configBase=http://bgisviewer.sanbi.org/Geocortex/Essentials/REST/sites/Mining_guidelines/viewers/Mining_Guidelines/virtualdirectory/Resources/Config/Default&user=&extent=&layerTheme=

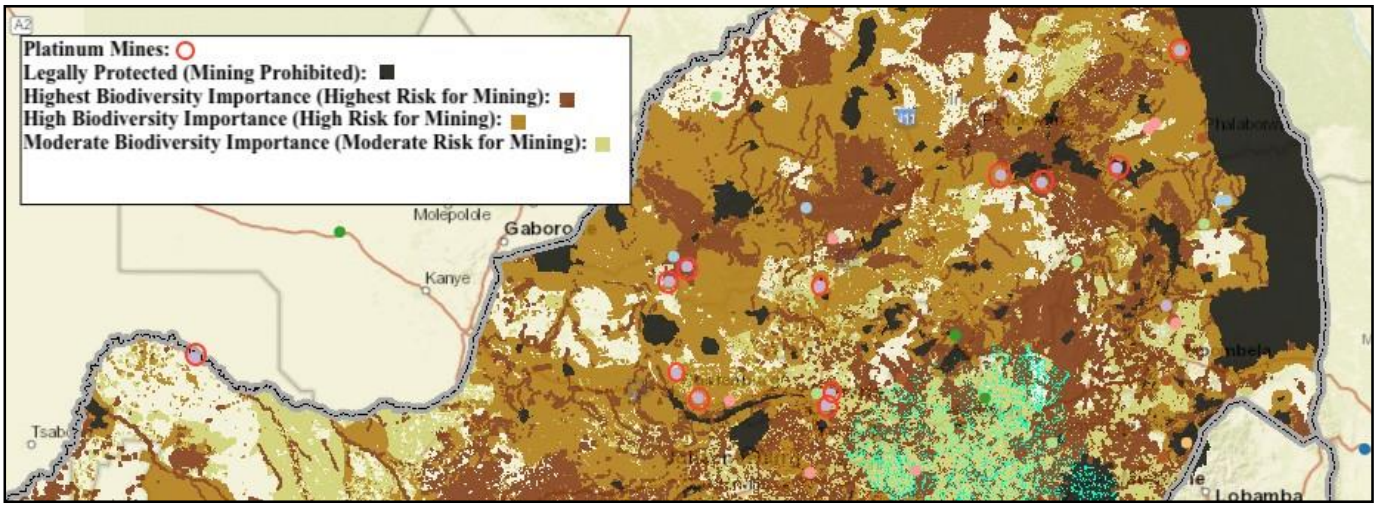


Figure 9: Platinum Mines in and around Biodiversity-Rich Areas
Source: South African National Biodiversity Institute (2018). Retrieved from http://bgisviewer.sanbi.org/Html5Viewer/Index.html?configBase=http://bgisviewer.sanbi.org/Geocortex/Essentials/REST/sites/Mining_guidelines/viewers/Mining_Guidelines/virtualdirectory/Resources/Config/Default&user=&extent=&layerTheme=

Closure and Rehabilitation

Before prospecting or mining can take place, a mining company must obtain a right by applying for approval through the DMR (Centre for Environmental Rights, 2016). The applications include an Environmental Impact Assessment (EIA), which incorporates an Environmental Management Program (EMPR), a Mine Works Program, and a Social and Labor Plan (SLP). Companies must also apply for a water use license through the Department of Water and Sanitation (DWS) (Centre for Environmental Rights 2016). Mining or prospecting in South Africa without a license is illegal and a criminal offense (Centre for Environmental Rights, 2016). However, DWS is highly understaffed and the process for approval for a water license is two years with the proper paperwork: notwithstanding, the mining companies proceed to mine because they would otherwise forego a large amount of capital (Interviewee G, personal communication, November 11, 2018). Despite this regulatory system, at the end of a mine's life cycle, mining companies are able to bypass the DEA's Financial Provisioning Regulations, which determine how mining rehabilitation costs should be calculated and funded, and according to which, in theory, the "polluter pays" (South African Human Rights Commission, 2016). Additionally, EMPRs submitted by mining companies are often vague or propose unrealistic promises that the land will be restored to its pre-mining state (South African Human Rights Commission, 2016). Furthermore, mining companies must present an environmental risk report and apply for a closure certificate, which will only be released once sustainability objectives for the mine have been met (South African Human Rights Commission, 2016).

Rehabilitation, according to mining companies, requires the hire of a private consultant on an annual basis to assess the damage and report the cost to rehabilitate the mining land if that mine were to close that year. The report is then sent to the regulator to review. Thereafter, the mining company can 1) give money for rehabilitation to the regulator or state or 2) initiate a bond order guarantee through a bank for the cost to rehabilitate the mining site. If the former is chosen, there is a reportedly high risk that the money will not be used for rehabilitation, but be embezzled at the municipality level. Consequently, mining companies are shifting toward bond order guarantees to follow through with rehabilitation funding, where it is ensured that the money will be used for rehabilitation and closure of mines (Interviewee G, personal communication, November 11, 2018).

Mining companies that cause environmental damage are usually issued large fines by the DEA and DWS; in some cases, CEOs or responsible persons are imprisoned. The Mining Act, Mining Charter, and Health and Safety Act require mining companies to place capable people in managerial positions who will comply with the stringent laws. Due to the substantial fines and the Mining Act, more mining companies are willing to follow the laws. At the same time, there are legal contradictions between the different Acts regulated by the DEA, DMR, and DWS. As a result, the mining companies feel pressured to utilize lawyers, who scrutinize each new law that is passed, on an increasingly regular basis (Interviewee G, personal communication, November 11, 2018). In addition, any land that is part of a nature conservation which is damaged by a mining company must be compensated for, i.e., for every one hectare of conserved land damaged by mining, 30 more must be purchased by the respective company and kept as a protected nature conserve (Interviewee B, personal communication, November 9, 2018).

Presently, around 6,000 mines are under continuous rehabilitation under the DMR's directive through the Rehabilitation and Management program for Derelict and Ownerless Mines (D&O Mines) (South African Human Rights Commission, 2016). The Council for Geoscience and Council for Mineral Technology and Research (MINTEK) have assumed the role of carrying out rehabilitation (South African Human Rights Commission, 2016). Additionally, there is no retrospective liability for abandoned or liquidated mines that have caused historic environmental damage (South African Human Rights Commission, 2016). The DEA and the DWS, as the main regulators, are considered understaffed, under-skilled, and lack commitment to the necessary follow-up (Interviewee G, personal communication, November 11, 2018). Mining companies are responsible for understanding what types of environmental impact is caused by their operations, and how they will mitigate those through their Environmental Management Plan (EMP), which is shared with the enforcing regulator (Interviewee G, personal communication, November 11, 2018).

Air quality, dust control, and blasting

Air pollution, a key problem for South Africa caused by mining, has had a striking impact on human health. The National Environmental Management: Air Quality Act (NEMAQA) was implemented through the DEA, and is a framework for managing air quality. However, there is uncertainty about the applicability of NEMAQA to mining activities. Primarily, this uncertainty

is due to the fact that some mining companies do not apply for or implement atmospheric emission licenses (South African Human Rights Commission, 2016). Additionally, starting in 2013, National Dust Control Regulations have been in place, but are not fully operational; larger mining companies do measure air pollution and dust, but most companies are not fully aware of the requirements (South African Human Rights Commission, 2016). In essence, there is currently little to no accountability for the mining companies: this is demonstrated by the levels of sulfur dioxide, nitrogen dioxide, and particulate matter (2.5 millimeters in diameter), as well as the most hazardous particles of dust, particulate matter (10 millimeters in diameter,) and carbon monoxide. The hazardous particles result from blasting operations, although mining companies are required to have a minimum of 500 meters distance from any infrastructure and have permits for transporting explosives. Currently, in areas where there is mining, such as Rustenburg, Mokopane, and Mpumalanga, the air quality levels are at moderate or unhealthy levels. When air quality reaches highly unhealthy levels, citizens cannot go outdoors for long periods of time without experiencing serious health effects (The World Air Quality Index Project, n.d.).

Access to Information/Transparency

In South Africa, access to information and transparency are often circumvented when it comes to mining (South African Human Rights Commission, 2016). Full public access to EIAs, EMPs, SLPs, annual implementation reports, as well as other mining-related information, would shed light on the actual level of risk caused by mining in South Africa, but these documents are not currently available to the public (South African Human Rights Commission, 2016). To acquire this information you have to apply for access through the South African government, which begins a long bureaucratic process (Interviewee G, personal communication, November 11, 2018). The Promotion of Access to Information Act (PAIA) states that citizens have a constitutional right to "access any information held by the State, and any information that is held by private bodies that is required for the exercise and protection of any rights (Promotion of Access to Information, 2000)." Yet, reportedly, the DMR does not push officials to disclose SLPs out of the fear that citizens will take action (South African Human Rights Commission, 2016).

Madagascar

Madagascar has over 2,000 plant species unique to the country, making it one of the most biodiversity-rich countries in the world (Carver, 2017). Sapphire and artisanal gemstone mining pose a threat to the country's immense biodiversity, and both plants and animals face the consequences of widely unregulated, artisanal mining. Land is most vulnerable during mining rushes described in earlier sections. Mining rushes occur once every few years and small areas of land are heavily mined for sapphires until resources run dry. Once resources are thought to be fully extracted, the mining rush ends and another rush is likely to reappear in a different sapphire-rich area. Many of those who engage in the mining rushes are migrants to the region and leave the mining areas once resources are exhausted. The scale of the sapphire mining rushes leaves the land stripped of much of its biodiversity and dries it of resources.

Process of Mining

As an artisanal gemstone, a majority of mining is ASM, and LSM companies do not have a heavy presence in the country. Similar to the mining production of large-scale companies, the process for small-scale mining for sapphires in Madagascar includes hollowing out and digging sapphire-rich areas (De Grave, 2017). One method used by miners is a pulley system where one miner is lowered into a hole and digs until they reach the sapphire level (Moriarty & Fiebig, 2016). However, since most small-scaling mining is done by people who do not work for a company and mining is carried out without monitoring, it is difficult to implement environmental regulations that comply with the country's mining code.

Deforestation

With mining rushes comes deforestation of the land surrounding the gemstone mines. Areas rich in sapphires are also often rich in biodiversity, increasing the risk of environmental degradation caused by mining. The Ankeniheny-Zahamena Corridor in Didy has been a popular area for sapphire mining, particularly during the November 2016 mining rush. In the year following the initial rush, more high-quality sapphires were extracted than the overall amount that was found in Madagascar since the discovery of the stone in the 1990s (Associated Press in Antananarivo, 2017). This influx of mining for the high-quality sapphires has led to the deforestation of the protected areas established by the Malagasy government.

Deforestation due to the increase of mining has not only been caused by miners clearing the area to dig for sapphires, but is also a result of the increasing populations of new and nearby towns. As towns rapidly grow, trees in protected areas have been cut down for shelter (Flores & Zavala, 2017). After the mining rush subsides, and people dependent on the mining industry leave the once sapphire-rich towns, those who stay in the town have to manage the environmental degradation caused by the mining. Mining can alter the landscape and biodiversity of a town within a short period of time and leave lasting changes in an area despite mining's temporary presence.

While sapphire mining can lead to deforestation, other sectors are primarily responsible for the country's overall deforestation. Agriculture, particularly slash-and-burn techniques, is the leading cause for deforestation in Madagascar (Gay- des- Combes, 2017). Although the sapphire mining industry may not be the most significant contributor to deforestation, areas that are mined become at-risk for deforestation. Deforestation impacts the already endangered lemur species in the country, specifically in Madagascar's protected forest-dense regions.

4.2 Environmental Protections

South Africa

There are a number of environmental protections established in South Africa. However, the extent to which they are utilized to protect the environment is a cause for concern and requires urgent action. NEMAQA Section 39 of 2004, along with the National Dust Control Regulations established in 2013, created national norms and standards for regulating air quality monitoring, management, and control, but both have faced challenges in terms of implementation (SAHRC 2016). According to Section 33 of NEMAQA, mining companies are required to notify the minister of the DEA if mining operations might cease within five years: the DEA has yet to receive any notices from mining companies (SAHRC, 2016). The National Water Act, 36 of 1998 (NWA) identifies Strategic Water Source Areas (SWSAs), which make up 8 percent of the total land of South Africa. Nonetheless, these SWSAs provide 50% of water to South Africa, Lesotho, and Swaziland; much of it is used for mining operations (SAHRC, 2016). There are no restrictions on water use by mines, but some mining companies do purchase gray water from wastewater treatment plants, treat the water once again, and then use it for their cooling process during the mining phase (Interviewee G, personal communication, November 11, 2018). The

National Environmental Management: Protected Areas Act, 57 of 2003 (NEMPAA) prohibits mining licenses to be granted for protected land, except with permission from the DEA and DMR (SAHRC, 2016). Specifically, Section 24 of the Constitution of the Republic of South Africa defines the right to an environment that is "not harmful to their health or wellbeing," and that is protected for "the benefit of present and future generations" (The Constitution of the Republic of South Africa, 1996). This section states the important difference between sustainable development and justifiable social and economic development (SAHRC, 2016).

The One Environmental System, established in 2014, was created to foster integrated planning and enforcement of environmental laws, as well as narrow gaps between the DEA, DWS, and DMR (SAHRC, 2016). The DMR is responsible for monitoring and enforcing environmental laws, as well as licensing for mining, and the DWS is responsible for water laws and licenses. In order to ensure that monitoring and evaluation is carried out without complications, an Enforcement Task Team as part of the Inter-departmental Project Implementation Committee (IPIC) conducts joint monitoring exercises (SAHRC, 2016). Despite this joint effort under the One Environmental System, it is evident that the DMR needs more oversight when it comes to environmental laws and licensing for mining operations.

Non-Compliance

Compliance measures are implemented by the DMR. Though 5 percent of all completed investigations were deemed non-compliant due to environmental issues (The Presidency Department of Planning, 2015), very few mining licenses are ever revoked and monetary fines alone have not been a sufficient deterrent for the possible criminal authorizations given to mining companies (SAHRC, 2016). The majority of non-compliance cases relate to closure and rehabilitation liabilities, obstructing the flow of rivers, taking water from boreholes (meant for drinking), and failure to do the following: submit revised Environmental Management Programs; conduct dust emissions, noise and groundwater monitoring; implement proper waste disposal, especially hazardous waste; monitor chemical spills and water pollution and implement proper techniques to clean them; and decontaminate water before it is released back into the dams (SAHRC, 2016).

To counter systemic non-compliance within the mining sector, a number of measures have been introduced. Collaboration between the South African Police Service and the DEA's

Environmental Management Inspectorate (EMI) allows them to investigate environmental crimes (SAHRC, 2016). Additionally, Environmental Crime Working Groups operate in some provinces, which includes the police and National Prosecuting Authority (NPA) and a formation of the Priority Crime Committee that focuses on illegal mining (SAHRC, 2016). South Africa requires more collaboration between different departments for the sake of the environment. Environmental degradation and the failure to conserve biodiversity within South Africa threatens access to sufficient food, water, health, housing, land, and the fundamental right to live (SAHRC, 2016).

Madagascar

The body that oversees environmental matters in Madagascar is the Ministry of Environment, Ecology, and Forests. The ministry includes stakeholders who encourage protection of Madagascar's environment, such as ministries, NGOs, donors, and local governments (Mountain Partnership, 2013). In addition to the Mining Code that is overseen by the Ministry of Mines, the Ministry of Mines alongside the Ministry of Environment, Ecology, and Forests oversee a inter-ministerial order that states the regulations for the mining sector concerning environmental protections (Ministry of Mines & Ministry of Environment, Ecology, and Forests, 2000). The order outlines the responsibilities of the Ministry of Mine's Environmental Committee, which oversees the environmental protection plan and suggests revisions to the plan's models. The committee is responsible for developing training programs to inform license holders of environmental protections in regards to mining.

While the government has the general framework for environmental sustainability and commitment, there is a lack of enforcement and accountability, especially among non-license holders. Most people do not seek a license because of its high price and the competitiveness of acquiring the license, which is further complicated by rent-seeking and the license payments demanded by Malagasy officials (Heyman, 2016). State officials also obtain positions in the mining industry through corrupted methods, such as bribery, and environmental protections are not prioritized. NGOs, such as Conservation International, have made requests to the government to increase protection over the forested areas (Associated Press in Antananarivo, 2017). However, because many state officials hold positions in the mining industry, further actions to enforce protections and security have been rejected by the government. Furthermore, the

environmental protection plan does not have effective mechanisms for curbing the environmental damage caused by illegal mining.

The National Biodiversity Strategies and Action Plans (NBSAP) was implemented in 2015 under Decree Number 2016-128 of 2016 to improve the biodiversity policy framework of various sectors in Madagascar, including the mining sector (Rabarison et al., 2015). The plan is overseen by the Ministry of Environment, Ecology, and Forests and financed by the United Nations for Environment Programme. The NBASP will expire in 2025, at which point the government plans to share the "best practices on mining exploitation and increase the number of those with the necessary tools to reduce their impact on the environment (Rabarison et al., 2015)." This strategy to improve environmental commitments will be monitored by the ministry.

Protection of Prohibited Zones

The protection of prohibited zones remains a challenge for the government to enforce in regards to the mining industry. The Inter-Ministerial Mining and Forest Committee (CIMF) was established in 2004 to aid in conflict mediation on mining permits in areas vulnerable to negative environmental impacts and established areas that would be protected from mining operations. While the CIMF established the areas protected from new mining licenses, there are protected areas that overlap with previous mining permits zones. According to a World Bank country report from 2013, as of 2008, about 900,000 hectares of protected land overlapped with existing mining permits (The World Bank, 2013). Since the political crisis in 2009, there is a lack of activity in the CIMF investigating and mediating these areas of overlap.

As part of the Mining Code in 1999, the Malagasy government established areas protected from mining; issuing permits for these areas is illegal. The Mining Code includes the "Environmental Commitment Plan," a plan overseen by the department responsible for mining under the Ministry of Mines. This plan details the environmental commitment required of mining license holders. Mining licenses serve to protect the land and are overseen by the Ministry of Mines and the Ministry of the Environment. The ministries ensure that holders are not violating any environmental regulations, and enforce the requirement to repair any damages that mining has had on the land. In Chapter 2 under Title V of the Mining Code, the government outlines the protections of the environment. This code states in Article 99 that mining companies are required to "minimize and repair all damages" caused by workers (Modified Mining Code, 2005).

While the Mining Code sets out laws and expectations of miners, the mechanisms to enforce the environmental protections laws remain limited and weak in Madagascar. Details on the methods to repair damages are not stated in the Mining Code and the broad language of the Mining Code does not specify the actions that miners and companies must take to avoid violations. Furthermore, law enforcement in protected areas is limited, including in areas that are rich in sapphires. Dense forest covers parts of these protected areas, making it difficult for law enforcement to efficiently survey the area.

Chapter 5: Health Challenges

Industries can pose their own, unique challenges to human health, e.g., mine collapse, as well as influence existing societal health determinants, such as access to freshwater. Sometimes, an industry can even mitigate health risks or improve health outcomes. This section will examine how the platinum mining industry in South Africa and the sapphire mining industry in Madagascar affected human health and food and water security.

5.1 Human Health

South Africa

Platinum mining in South Africa has a negative environmental impact, has led to pollution in the air, soil, and water, and consequently had serious impacts on human health, food security, water security, and the overall well-being of the communities proximate to the mines. The primary human health risks that the mining companies have acknowledged include dust and air pollution from blasting, and threatened food and water security (Interviewee B, personal communication, November 9, 2018; Interviewee G, personal communication, November 11, 2018). The DMR, along with the Department of Health and a collaboration of stakeholders, will continue to implement measures to improve occupational health for platinum miners. According to the Mine Health and Safety Inspectorate annual report in 2016-2017, the DMR has provided information on occupational safety, as well as occupational diseases, for the platinum sector. In 2016, safety among platinum miners improved by 33% in terms of the number of fatalities (DMR, 2018). In 2016, 28 fatalities were recorded for platinum mining, which, along with the gold mining sector, has one of the highest levels of fatalities compared to other types of mining (DMR, 2018). In terms of injuries in the platinum mining sector, there was a decrease of 8 percent in the total number of injuries; the total number of injuries in 2016 was 1,140 (DMR, 2018). In addition, mining companies agreed that the shallow mines that cannot fit machinery, where miners have to go on their hands and knees for eight hour shifts, take a toll on miners' bodies, and put them at risk for TB because of the lack of ventilation (Interviewee G, personal communication, November 11, 2018).

Between 2015 and 2016, occupational diseases reported in the platinum mining sector decreased by 46% (DMR, 2018). There was a significant decrease in over-exposure to airborne pollutants,

based on the Air Quality Index (AQI) for PGMs from 0.3 percent in 2015 to 0.2 percent in 2016 (DMR 2018). However, these percentages are based on samples and do not reflect the total percentage of exposed employees in the mining industry (DMR, 2018).

Larkin, Jason.(Photographer). 2014. Settlement near Platinum Mine in Rustenburg. Copyright of Jason Larkin from album "Tremors Below." Used with Permission.

Overexposure to noise and high temperatures is common for most miners during their eight-hour shifts. Noise exposure means over-exposure to noise bands A and B for miners. Band A represents noise over 105 decibels (dB), which can be considered the equivalent of being close to a helicopter or at a rock concert. This level of noise can have serious damage after a worker's eight-hour shift. Band B is noise between 85 dB and 105 dB, which is likely to cause damage if overexposed. Mining for PGMs had an overall reduction in over-exposures, but still had a significant amount of noise exposure, with a notable increase in band A noise in the region Limpopo from 00.25 percent in 2015 to 3.66 percent in 2016 (DMR, 2018). In addition, miners

in the platinum industry can be over exposed to thermal stress or heat. Overexposure means temperatures greater than 32.5ºC (Wet bulb) or greater than 37ºC (dry bulb). PGMs have had an increase in over exposures. This primarily occurs at refinery plants, especially those in Rustenburg and Limpopo. The Mpumalanga refinery maintained zero exposure for both years (DMR, 2018).

Occupational diseases within the platinum sector include the following: silicosis, pulmonary tuberculosis (PTB), noise-induced hearing loss (NIHL), asbestosis poisoning, and other diseases which have not been defined. In 2016, out of the 166,517 workers employed in the platinum mining sector, 68 had silicosis, 778 had PTB, 347 had NIHL, one had asbestosis, and 24 had other diseases (DMR, 2018). Overall, there was a 46% decrease in occupational diseases for all categories except "other diseases" (DMR, 2018). Miners who previously worked in gold mining were most at risk for silicosis (DMR, 2018). The decrease in PTB is due to increased awareness and counseling, as well as attentive screening processes for employees (DMR, 2018). Miners in zones where noise exposure is the highest have received counseling and been given custom- made hearing protection (DMR, 2018). Throughout the three platinum mining regions, there has been an overall decrease in occupational diseases: in Rustenburg by 46%, Limpopo by 29%, and Mpumalanga by 15% (DMR, 2018). Within the platinum mining sector, there have been a total of five fatalities due to occupational diseases in 2016 (DMR, 2018). Platinum miners experience silicosis and PTB at higher rates than the rest of the population, which is largely attributed to cross recruitment, migration, and the contract labor system; health conditions are aggravated by the poor living conditions (Phillips, 2000). The Mine Health and Safety Act is highly stringent, and one of the most regulated, as mining companies need to submit reports on a monthly basis, and the government requires the mining companies to set a fund aside for compensation of employees if they suffer from injuries, illness, or diseases (Interviewee B, personal communication, November 9, 2018). Additionally, the mining companies along with the government jointly address the health concerns by providing initiatives such as health campaigns, and miners have access to the health clinics that are funded by the government (Interviewee B, personal communication, November 9, 2018; Interviewee G, personal communication, November 11, 2018). Due to these initiatives, there has been a drastic decrease in HIV (Interviewee B, personal communication, November 9, 2018). Yet, some mining companies do not feel that it is their responsibility to fund health clinics for their miners, even if

they are the cause of these problems or if this falls under their Corporate Social Responsibility (Interviewee G, personal communication, November 11, 2018).

An estimated 7,200,000 people in South Africa live with HIV. The total mortality rate from tuberculosis in 2017 was roughly 78,000 people, and of those 78,000, 56,000 were also HIV positive (WHO, 2017). This high rate of HIV is partly because of South Africa's history of migrant laborers coming to work in the mines for long-term contracts (Interviewee B, personal communication, November 9, 2018). In 2016, platinum mining companies showed reduced compliance for managing employees in terms of hiring contractors for HIV counselling and testing (HCT) services and for PTB programs for miners and contractors. Despite the fact that 86% (144,521 employees) have undergone counseling for HIV, only 56.3% (81,401 employees) agreed to be tested for HIV, and 9.5 percent (7,722) of employees who were tested, tested HIV- positive (WHO 2017). However, the platinum mining industry holds the highest percentage of HIV counselling compared to other sectors (WHO, 2017). As for PTB, screening increased to 97.9% and the overall number of employees diagnosed with PTB decreased from 1.0 percent to 0.3 percent. Yet, the co-infection rate remained at 63.2% (WHO, 2017).

Due to dust from blasting operations and overall air pollution, there have been many problems with respiratory health. Sulphur dioxide and particulate matter (2.5 millimeters in diameter) dust exposure is a significant problem for communities located near the platinum mines. Sulphur dioxide exposure mainly comes from smelter and converter emissions and causes decreased lung function, respiratory illness, alterations in pulmonary defenses, and aggravation of any existing cardiovascular diseases (WHO, 2006). Anyone with asthma is most susceptible to cardiovascular disease or chronic lung diseases, such as bronchitis or emphysema (WHO, 2006). There is no safe level that the population can be exposed to and there has been an increase in mortality rates because of sulphur dioxide emissions. There are two sizes of particulate matter, 2.5 or 10 millimeters in diameter, which are referred to as PM2.5 and PM10, respectively. PM2.5 causes more damage in terms of health, because of its smaller size and lower concentrations (WHO, 2006). PM2.5 affects breathing and respiratory systems, causes damage to lung tissue, and increases the risk of cancer and premature death (WHO, 2006). PM2.5 also has no safe level of exposure and people living with chronic lung disease, influenza, or asthma have an increased sensitivity to PM2.5 (WHO, 2006). The public does not always get notified that blasting

operations will occur, though the DMR requires that mines must conduct a risk assessment to determine the impact on workers and the communities nearby in terms of both dust and noise pollution (SAHRC, 2016). Besides this, blasting operations remain largely unregulated and few mining companies have complied with the Mine Health and Safety Act 29 for the Regulations on Explosives (SAHRC, 2016).

Madagascar

The Madagascar Mining Code states that the holder of a mining permit, which is legally required for sapphire mining, is responsible for the health and safety of all those mining on the permitted site and is obligated to report any injuries that occur there (Malagasy Mining Code, 2005). Mining is a hazardous occupation by nature, and can be particularly so when it is done without safety regulations or training, as most of Madagascar's sapphire mining is conducted. Miners working without proper protective gear or in insecure environments are at an elevated risk of incurring physical injuries from hazards such as equipment accidents, mine collapses, and gas exposure (Smith, 2014). These risks are compounded by the lack of adequate medical resources at informal dig sites. Due to the general lack of oversight, there is no official record of deaths and injuries related to sapphire mining.

Artisanal miners are in a very compromised position because of the illicit nature of their activities. They are vulnerable to blackmail and exploitation by the police, government officials, and middlemen. In an Afrobarometer survey, researchers polled on the perception of the mining sector's impact on physical security by way of increased law enforcement presence at mining sites. A majority reported that security was not improved, with older, rural populations (arguably the most economically and physically vulnerable) in particular citing no improvement in security ("AD138: Digging a future? Citizens see positive impact of mining in Madagascar | Afrobarometer", 2018).

5.2 Food Security

South Africa

Food security in South Africa has a significant impact on the population. According to the Global Food Security Index, South Africa rates 64 out of 100 for the best for overall affordability, availability, quality, and safety, and yet only ranks 44 overall compared to other

countries (USAID, n.d.). Additionally, 4.6 percent of the population is undernourished and the Global Hunger Index demonstrates a moderate level of hunger in South Africa (USAID, n.d.). The overall water quality and quantity is a serious problem for the agricultural sector. Only 86.7% of the population has access to potable water, whether it is acquired from a borehole, public standpipe, household connection, protected dug well or spring, or from rainwater (USAID, n.d.). Overall, there is no commitment to the development of early warning measures for the agricultural sector and climate-smart practices, even though South Africa runs a high risk in terms of water security (USAID, n.d.). In the past, South Africa received little to no food aid or only for emergency purposes. In the last two years, South Africa has increased the amount of food aid that it receives (USAID, n.d.). Furthermore, corruption could compound risks related to food availability, use of natural resources, and inefficiencies in food distribution (USAID, n.d.). Although there is considered to be no proof of contaminated agricultural areas, mining companies did acknowledge that the dust pollution could have an effect on the agricultural sector if people were to ingest food with dust particles (Interviewee G, personal communication, November 11, 2018). The overall decrease in food production, increase in risk to the quality and quantity of water, and the increase in demand for foreign aid is cause for concern in terms of South Africa's future food security.

Madagascar

In general, Madagascar experiences a high level of food insecurity, with 48% of households struggling to put food on the table. It ranks fifth highest in the world for malnourishment. This is despite the fact that agriculture employed as much as 80% of the Malagasy population and makes up 33% of the country's exports (Rarison, 2018; OED, 2018). Particularly vulnerable are rural populations, for whom subsistence farming is the primary economic activity. Seasonal cyclones and flooding, as well as droughts like those experienced in the fall of 2018, periodically damage the island's rice crops (FEWS NET, 2018). Like the population at large, participants in the sapphire mining industry sometimes experience food shortages as well. The remoteness of many mine sites often means that miners are limited in terms of the food and water that they can bring with them to the encampment. However, participation in the mining industry can also be a very positive economic opportunity for many. During a particularly bad drought which caused rice crop failure, the mining town of Ilakaka was insulated from the worst effects as citizens'

incomes from the sapphire mines allowed them to buy the rice that many other Malagasy could not afford (Interviewee A, personal communication, November 6, 2018).

While it is apparent that many are leaving their agricultural livelihoods to pursue opportunities in sapphire mining, we found no evidence of existing farmland being repurposed for mining. Yet, the Food and Agriculture Organization of the United Nations has reported that, since 2009, there has been a pronounced decrease in the amount of land allocated to cereal production. Fortunately, a steady rise in crop yield during this time has meant that total cereal production, while it has fallen, has not done so at the same rate as land loss (FAO, 2018). This suggests that farming is increasing in productivity, which if continued, will hopefully solve Madagascar's food insecurity in the future.

Smith, T. (Photographer). (2015). Farmland, Betsileo community, Madagascar. [digital image]. Retrieved from https://www.tobysmith.com/project/madagascar-illegal-sapphire-mining/

5.3 Water Security

South Africa

There is limited data about water security, i.e., water resources and use, in South Africa. There is a 12.8% dependency on water resources from other countries, and 10.5% of all water is used by industries, while municipal water use makes up 27% of total water withdrawal (USAID, n.d.). In 2013, a total of 30.2% of the total renewable water resources were withdrawn. Increased levels of mining operations could be contributing to the depletion of renewable water resources (USAID, n.d.). According to the EPI's water resources score for South Africa, the country has an established wastewater treatment system and received a score of 87.8 out of 100 for moderately- high performance (USAID, n.d.). Yet, it ranks 50 compared to other countries (USAID, n.d.).

Larkin, Jason.(Photographer). 2014. Settlement near platinum mine in Rustenburg. Copyright of Jason Larkin from album "Tremors Below." Used with Permission.

When it comes to mining, the DWS does not have an allocated budget for rehabilitation of abandoned mines, yet they hope, by establishing the Draft Mine Water Management Policy in 2017, to protect water resources from the impact of mining by conducting impact prediction assessments and improving overall environmental awareness (DWS, 2017). However, there are no restrictions on mining companies for water use, but some mining companies purchase gray water from the local wastewater treatment plants, about 90% of the water used for mining companies. Then the water is treated further before mining companies use it for the cooling process (Interviewee G, personal communication, November 11, 2018). The contaminated water after hydro-mining that is kept in retaining dams within the mining premises, is then filtered and turned into recycled water once again before it goes into the air refrigerated systems underground, which is similar to AC, and the cooling plants (Interviewee B, personal communication, November 9, 2018). Under the National Water Act, Water Use Licenses (WULs) are issued after receiving approval from the DWS (DWS, 2017). However, there is lack of information regarding the WUL application process, information about water quality and availability, monitoring of mining companies that have the WUL, and the overall impact of mining on the water reserve (DWS, 2017). Water shortages impact communities' basic human needs, yet mining companies continue to conduct operations that repeatedly draw water from limited natural water sources. This impacts not only the communities at large, but the ecological infrastructure as well (SAHRC, 2016). Mining companies are the main contributor to the depletion and pollution of water resources, and as a result, municipalities struggle to provide water to their affected communities. This has created a crucial challenge for the DWS (SAHRC, 2016).

Acid mine drainage (AMD) is also a critical problem for platinum mines, because of the amount of chemicals that are deposited in slime dams during the floatation and drying process (Cairncross, 2014). The long lasting impacts from AMD sterilizes the soil, may contaminate crops, threatens biodiversity, and has an enormous impact on human health, especially for communities near the mines (SAHRC, 2016). AMD is dealt with on a case-by-case basis, since it is not formally defined by current legislation, especially in regards to management and treatment processes (Federation for a Sustainable Environment, 2018).

Madagascar

As with food, Madagascar suffers from severe water insecurity, with 58% of Malagasy lacking safe drinking water and nearly half of all households living without sanitation facilities ("Water | Madagascar | U.S. Agency for International Development," 2018). The situation is even more dire in rural areas, with a 2009 World Bank report estimating that as recently as the 1990s, a mere 12% of the rural population had access to safe drinking water. The problem is not that the island does not receive enough rain, but rather that water is not managed well. The African Development Fund estimates that Madagascar uses only 3.9 percent of available water annually (*Water – Madagascar*, 2018). The major barrier to safe water access is insufficient infrastructure to deliver the water where it is needed, and changing this would require political will and competency that the government has yet to demonstrate.

While sapphire mining does usually involve water, it is not enough to impact national water security. There is however the potential for localized pollution, where the activities of the miners may stir up sediment in the river, as well as possibly contaminate it with improperly disposed waste. As with food security, miners gainfully employed in the sapphire industry can afford privately supplied water (Interviewee A, personal communication, November 6, 2018).

Chapter 6: Human Rights Challenges

This chapter explores the risk the platinum industry in South Africa and the sapphire industry in Madagascar pose to the human rights of affected populations, particularly miners and residents from nearby towns. This section is driven by the five human security pillars outlined by the United Nations Development Human Security Index relative to the precious mineral and gem industries: workers' rights, indigenous/ethnic group rights, women's rights, children's rights, and freedom from violence (Human Development Report, 1994). We will provide an analysis of human rights applied to both case studies according to these five components and will include relevant subsections for each case.

Larkin, Jason.(Photographer). 2014. Settlement near Platinum Mine in Rustenburg. Copyright of Jason Larkin from album "Tremors Below." Used with Permission.

6.1 Workers' Rights

South Africa

Platinum mining in South Africa is primarily conducted on a large-scale and medium-scale by major platinum companies, such as Anglo American Platinum, Implats, Lonmin, Stillwater Mining, and Northam Platinum Ltd, to name a few (Bill, 2018). Some companies and individual groups also conduct ASM. The mining companies operating in South Africa reputedly closely follow the mining laws and regulations of the country, especially in terms of human rights (Interviewee B, personal communication, November 9, 2018; Interviewee G, personal communication, November 11, 2018). The rights of workers in LSM, MSM, and ASM are protected by a number of laws and regulations, including the constitution of South Africa, which gives everyone in the right to work in an environment that is not harmful to their health or wellbeing (The Constitution of South Africa, 1996).

Safety of Working Conditions

Platinum mining is a labor-intensive and potentially dangerous profession if proper safeguards and standards are not in place. The government of South Africa regularly inspects and monitors the mining companies to ensure they comply with the existing laws and regulations to prevent the possibility of worker injuries and fatalities. While the rules and regulations equally apply to all mining companies, it is more difficult to regularly inspect small-scale mines located in remote rural areas due to the limited capacity of government and civil society organizations (Chamber of Mines of South Africa, 2017). Conventional methods of platinum mining often involve labor-intensive activities such as drilling holes in the rocks and removing debris after the detonations. To operate in such an environment, workers are supposed to adhere to safety hazard standards by wearing safety equipment such as helmets, glasses, noise-quieting head-gear, and other necessary equipment depending the stage and location of mine (Bowman, 2016, Chamber of Mines of South Africa, 2017).

Through the Occupational Diseases in Mine and Works Act (ODMWA), workers in the mining industry are entitled to receive benefits to cover treatment expenses for compensation-eligible diseases such as pneumoconiosis, tuberculosis, phthisis, or silicosis, for themselves as well as their dependent family members (ODMWA, 2002). The reports show that some of the mining

companies are not complying with this act, failing to compensate workers that suffer from the aforementioned diseases (South African Human Rights Commission, 2015).

The mining companies in South Africa have made good progress in terms of fatality rates in the past two decades: the number of fatalities has consistently remained below 100. At the current rate, the mining sector in South Africa is performing better than developed mining countries, such as the United States, Canada, and Australia. In 2017, the total number of fatalities in South Africa's platinum sector was reported at 26 compared to 27 in 2016. Likewise, the number of injuries in platinum mining also decreased in 2017, totaling 1,104 compared to 1,120 in 2016. The main causes for fatalities and injuries in mining were mine collapses, general accidents, and accidents during transport (Chamber of Mines of South Africa, 2017). Since illegal miners do not follow a safety standard, the total number of fatalities in illegal mining in South Africa is always high. In 2014, 200 illegal miners were trapped in one mine, while 26 fatalities were reported at other illegal mining sites. Considering the nature of illegal mining (workers have to operate in secret from the government), it is highly difficult to verify the exact rates of fatalities in illegal mining as they are not reported (South African Human Rights Commission, 2015). According to the Chamber of Mines reports, over 70% of illegal miners are undocumented foreign nationals. Therefore, the fatalities of illegal workers often remain unnoticed and unreported (PWC, 2017).

In 2012, the Chamber of Mines of South Africa established the "The CEO Zero Harm Forum" to facilitate and promote occupational health and safety initiatives in South Africa's mining industry to reach the goal of zero harm by 2024 by sharing experiences and key challenges. The CEOs of 14 major mining companies are members of this forum, and they meet quarterly. In 2017, the members of the Forum acknowledged the fact that the mining industry has not undertaken improved measures for preventing incidents of mine collapses and transport, which have not decreased in the past five years. As a result, they developed critical controls as the part of an occupational health and safety risk management strategy and adopted the people-centric collision management system to address the transport-related incidents. Likewise, the Chief Inspector of Mines and all CEOs affirmed their commitment to preventing any incidents causing fatalities because "every fatality is one too many" (Chamber of Mines of South Africa, 2017).

Ability to Advocate

As per Chapter 2, Article 23 of the Constitution of South Africa, every laborer has the right to form and join a trade union, participate in the activities and programs of a trade union, and strike or protest. With the existing laws, the workers in the mining industry can negotiate with employers about their remunerations and benefits anytime they want. Through the workers' unions, miners often strike against the malpractices and negligence of mining companies if they do not provide safe working conditions and gradual raises in in terms of grade, salary, and benefits depending on their performance and the rising cost of living. Most of the experts interviewed for this report confirmed that the working conditions of miners have improved compared to the past. They affirmed that workers' strikes had had positive impacts on the improvement of working conditions. However they gave the credit to the relevant government institutions and the International Labor Organization for undertaking reforms to improve the working environment for miners in South Africa (Interviewee G, personal communication, November 11, 2018; Interviewee B, personal communication, November 9, 2018; Interviewee
N, personal communication, November 12, 2018).

Similarly, some leading civil society organizations like the Bench-Marks Foundation and Corruption Watch have played crucial watchdog roles for the government and mining companies to not only prevent the possibilities of malpractices and corruption, but also to safeguard the rights of workers (Interviewee B, personal communication, November 9, 2018; Interviewee G, personal communication, November 11, 2018; SAHRC, 2015). Likewise, the Chamber of Mines of South Africa and Minerals Council of South Africa are closely collaborating with government institutions to implement the National Development Plan for "eradicating poverty, removing inequality and reducing unemployment." In line with this, they are following up with the mining companies to facilitate training and skill development opportunities for workers including learnerships, bursaries, apprenticeships, and internships (The Chamber of Mines of South Africa, 2017).

Fair Compensation

The government of South Africa enacted the "Employment Equity Act" in 1998 to promote equal opportunity and fair treatment in employment through elimination of discrimination. With

this act, all citizens of South Africa, irrespective of their color, race, gender, and religion, are equally qualified for any position in the workforce of South Africa. Despite the existence of this act, constitution, labor law, as well as the international conventions, workers, especially women and marginalized groups, have not received equal treatment in terms of fair compensation and job promotions (U.S. Department of State, 2017).

Over 40% of operation costs in platinum mining are for the salary and benefits of miners, because of the labor-intensive nature of work (PWC SA Mine, 2018*)*. The workers in the platinum industry receive an average wage of $50,000 USD per year, which is less than the average wage of miners working in coal and iron industries. The average wage rate of miners in the platinum sector increased from R6,000 ($429.74 USD) in 1992 to R16,000 ($1145.98 USD) per month in 2014 (Bowman, 2016). Since the mining companies are supposed to provide health insurance, pension funds, child care, funeral costs, and housing for full-time employees, they incur on average 40% more operational costs than they would by hiring contract laborers (Bowman, 2016).

The mining companies have to provide housing facilities to miners close to the mining sites. However, reports indicate that mining companies are not providing standard housing for miners and in some cases they even do not offer any housing facilities. One study showed that approximately 66% of miners received housing in single-sex hostels, and 45% of miners received family houses living with their spouses and children. The housing facilities do not meet the minimum international living space standard, and rooms are usually overloaded (Dansereau, 2010).

The mining companies attempt to avoid providing full-time employee benefits by outsourcing mining work to contractors. This transfers the responsibility for workers from the private sector to the public sector. Though it is labor-intensive and hazardous, some people choose to work as contractors without benefits because of increased rates of unemployment (Dansereau, 2010; Cairncross et al., 2013). The government of South Africa recently signed a law to increase the minimum wage rate to R20 ($1.43 USD) per hour as of January 01, 2019. Some analysts warned that the act will further exacerbate the current unemployment rate of 27% because most employers will cut a number of employees or will subcontract labor (Mahlakona, 2018).

Legal Protections of Miners

In post-apartheid, the successive governments in South Africa strived to protect workers' rights and promote fair treatment in the workplace by enacting of a number of bills, as shown in Table 1.

Table 1. Workers' Rights Legislation

Legislation Relevant to Workers' Rights in South Africa	
1. Constitution of the Republic of South Africa	8. Manpower Training Act
2. Employment Equity Act	9. Occupational Health and Safety Act
3. Promotion of Equality and Prevention of Unfair Discrimination Act	10. Compensation for Occupational Injuries and Diseases Act
4. Protection from Harassment Act	11. National Youth Commission Act
5. Basic Conditions of Employment Act	12. Skills Development Act
6. Unemployment Insurance Act	13. Basic Conditions of Employment Act
7. Guidance and Placement Act	14. National Minimum Wage Bill

Prevalence of Forced Labor

Chapter 2, Article 13 of South Africa's constitution prohibits any forms of slavery, servitude, or forced labor. The prohibition of forced labor is also re-stated in Chapter 6, Article 48 of the Basic Conditions of Employment Act, 2002 which reinforces that no person should be employed by force either for his or her benefit or for the benefit of someone else (Constitution of South Africa, Basic Conditions of Employment Act, 2002).

The experts interviewed for this report did not know of any cases of forced labor in the formal industry. With strict regulations in place, the mining companies cannot afford to take the risk of violating the existing rules and regulations of South Africa: doing so would risk incurring fines and threaten their international reputation and brand. The mining companies that have mining contracts in South Africa strictly follow the existing legislation of South Africa (Mahlakona, 2018).

However some reports show that there have been cases of forced labor in the illegal mining industry, where migrants from Zimbabwe, Mozambique, and Lesotho who do not have legal documents or permits are working. In these cases, organized criminal groups have forced migrants to work, but then did not compensate them for their work. (U.S. State Department, 2017; Cairncross et al., 2013)

Madagascar

Safety of Working Conditions

In ASM, sapphire mining rush sprawls last for weeks or months at a time, and miners either camp around the mine, worried they will lose their place otherwise, or take several mile treks, sometimes taking hours each day, from neighboring villages to get to the mines. A mining site at Ambatondrazaka revealed squatter-like conditions: most miners were living in makeshift tents under plastic roofs and did not have access to clean water (Perkins & Pardieu, 2016). Since neither the government nor large companies usually regulate artisanal and small-scale mines, these miners are susceptible to contracting diseases. Ilakaka has been plagued with cholera outbreaks due to water contamination and lack of proper sanitation. Further impacts of mining on diggers includes chronic respiratory issues (Cook & Healy, 2012). Deaths also occur because of a lack of adequate tools and protection while working inside the mines (De Grave, 2017). Most deaths seem to have been caused by collapsing mines but they do not always get reported due to the informal nature of the activities (Duffy, 2005 & 2007). According to some accounts, it seems the prevalence of death in the mines may have decreased since the time sapphires were first discovered in Madagascar. From one Malagasy miner's account, in 2001, miners would die weekly in the mines, but that rate seems to have decreased (Smith, 2015). It would be inaccurate to say, however, that deaths in the mines no longer occur. As with any unregulated mining

activity where miners lack proper safety equipment, chances of fatal incidents are likely.

Some non-profit organizations, such as the Catholic Relief Services, have served to prevent the spread of disease in mining areas, but since there are few of them in areas where mining occurs, it is difficult for NGOs to provide greater protection (Duffy, 2005; Interviewee A, personal communication, November 6, 2018). Since it took the Malagasy government many years to formally recognize the Ilakaka settlement, for a long time there were no attempts to organize public services such as garbage collection, or to install sewage management systems (Duffy, 2005). Since 2005, the government has made an effort to provide social services there after they recognized the site's profitability. In December 2017, the director general of the National Social Welfare Fund visited Ilakaka and conducted a three- day training on social protection regulations and practices for various industries in the town. Per one local's account, the training allowed the local employers engaged in various economic activities to understand their workers' rights and employers' obligations (Madagasikara, 2017).

Ability to Advocate

The way miners are organized varies by area. Miners work either individually, with their families, or they organize into regional associations, not to be confused with formal unions (Cook & Healy, 2012). Several case studies have shown futile attempts at formalizing artisanal miners into working groups. At the Ambondromifehy mining site, attempts by outsiders to help create work associations from miners' informal relationships were not effective, and difficulties arose from an attempt to set up a single marketplace where all miners and dealers could conduct business transparently (Walsh, 2012). Depending on the miners' organization preferences, they will agree to either split profits from all the sapphires found that day (shared with a sponsor), or to keep whatever they find for themselves. Regardless of the agreement, since only one miner at a time is able to delve deeper into the narrow tunnels to search for more stones, individuals who find sizeable sapphires may stash particularly good finds in their mouths or elsewhere in order to avoid profit sharing. This shows a sense of competition between the miners even though many choose to work together (Walsh, 2004).

Since ASM mining without a proper permit is illegal by government standards, miners do not have a formal way of voicing their concerns and cannot appeal during the gem trading and

compensation process. Foreign buyers profit greatly from the trade, because they can set the consumer sale price of the stones at much higher levels than what miners receive in compensation. Buyers can even cooperate to ensure all miners receive the same low level of compensation, though the final sapphire product is sold for much more on the global market. However, through years of experience, miners have learned to use deception techniques, e.g., by claiming certain stones' exclusivity when presenting them to buyers (Walsh, 2004).

In theory, even if sapphire mining unions were to be created, the capacity for Malagasy miners' voices to be heard would be limited by the lack of recognition from the government and suppression stemming from Malagasy elites. Miners would have to formalize efforts and declare union groups, which would mean they would be asked to pay taxes on the stones they extract (Interviewee A, personal communication, November 6, 2018). Miners who make very little money daily do not find this favorable. The government's inability to organize a sound tax system reduces the citizens' ability to bargain with the government to demand political change (Smith & Dorward, 2014). More recently, the Malagasy government approved taxation payments from sapphire exporters, who can much more easily cover the tax costs than the impoverished miners. This is a positive step forward in making the formalization of the industry more cost- manageable from the perspective of the digger (Interviewee A, personal communication, November 6, 2018). Overall, the nature of how sapphires are extracted and evaluated creates difficulties for formalization efforts by ASM miners in comparison to the gold mining co-ops in Madagascar (Interviewee N, personal communication, November 12, 2018).

In several instances of attempts at LSM, infrastructural development produced was not adapted to the needs of the locals (Canavesio, 2014). The few foreign companies who have tried to establish headquarters in Madagascar hired geologists, armed personnel, and advanced technology near the Ankarana reserve, but employed risk-reducing advantages for themselves and not for the miners whom they intended to employ (Walsh, 2003). Several companies found the sapphire mining industry to be less profitable than they thought it would be (Interviewee N, personal communication, November 12, 2018). Operability issues escalated after the government imposed their gem export ban in February 2008, detailed Chapter 3 (Interviewee A, personal communication, November 6, 2018). The ban forced Sri Lankan and Thai buyers to leave the country, and thousands of unregulated ASM miners lost the means to sell stones formally (Cook

& Healy, 2012). This ban likely fueled more informal ASM sales and caused greater distrust between the miners and the Malagasy government (World Bank, 2010; Interviewee A, personal communication, November 6, 2018).

Fair Compensation

The World Bank (2010) estimates that miners receive about five percent of the international retail price for cut sapphires and that rent distribution for panners, diggers, and loggers is about 10%. For many miners, incurring risks and suffering potentially unfair deals is still better than engaging in other means of subsistence. Sapphire mining wages can reach up to $1.75 USD per day, which is six or seven times more than what could be earned by farming (Heywood, 2007). Additionally, agricultural industries pose the risk of crop failure and theft of livestock.

In many cases, even when miners earn a decent amount of income from sapphires, they do not always have the mechanisms to send remittances home and instead spend what is considered "hot money" on more immediate activities, such as drinking and prostitution. While these types of activities can be heavily criticized, it is important to note the majority of the miners are young men whose consumptive behavior is indicative of their inexperience and age. The miners still view themselves as active citizens and believe they are taking control of their own lives, even when they spend money recklessly (Walsh, 2003). Not everyone has a "hot money" mentality, however. The older, more experienced miners, can be described as deliberative, collective- oriented, and responsible. They invest the money earned from stones to purchase homes and cattle, or send it back as remittances. Miners' ability to send remittances depends on the surrounding safety conditions and availability of money transfer mechanisms (Walsh, 2003).

At some mining sites, a hybrid form between LSM and ASM has been established (Interviewee A, personal communication, November 6, 2018). Patrons who have land ownership rights sometimes employ miners, supply them with goods and tools, and transport and sell the miners' stones (Heywood, 2007). Typically, they will pay miners somewhere between $1 to $1.50 daily, which creates wage stability. Monthly or quarterly, they sell the stones to a buyer while a representative of the workers is present at the sale so the workers can receive a percentage of the sale (Interviewee A, personal communication, November 6, 2018). A Swiss entrepreneur who owns a 40 to 50 meter deep mine called the "Swiss Bank" in Ilakaka uses this type of informal employer-employee contract. The Swiss Bank has been in operation since the first gem rush in

Ilakaka, from about 14 years ago (Interviewee H, personal communication, November 8, 2018). There are also some French and Italian jewelers rumored to reside in Madagascar, who also utilize this type of patron-miner relationship, which could indicate that the hybrid industry method is becoming more prominent. Although critics of such a system accuse patrons of perpetuating human rights abuses, the quasi-organization of the patron-miner relationship is a more stable alternative for miners than not having a boss at all. At the very least, the miners are able to receive a daily wage and are often provided food (Interviewee H, personal communication, November 8, 2018). Most reports we were able to find, however, highlighted non-patron mining, done predominately by individuals or families (Interviewee A, personal communication, November 6, 2018).

Perkins, R.. (Photographer). (2016). Thousands of independent Malagasy miners work the sapphire deposit in the rainforest east of Ambatondrazaka. [digital image]. Retrieved from https://www.gia.edu/gems-gemology/winter-2016-gemnews-sapphire-rush-near-ambatondrazaka-madagascar

Legal Protections of Miners

With the achievement of the 2005 Mining Code, the government drafted a more developed social and environmental policy to address ASM. In a section of the new code, the Malagasy government stated they would integrate LSM with ASM projects within regional development

and promote good governance and management in ASM (Cook & Healy, 2012). So far this promise has not translated into action. Additionally, in accordance with the Malagasy Environmental Charter, ASM activities would have to be pre-approved by the Environmental Engagement Plan (EEP). This is reiterated by the Inter-Ministerial Order 12032/2000, which is focused on protecting not only the environment, but also the local populations and rehabilitation practices. Small scale miners are supposed to apply for EEP-PRE permits, which are simplified for their needs. However, to be eligible for a permit, ASM miners have to abide by many rules, including digging no deeper than 20 meters and working with 20 or less people on one site. They cannot use chemicals, explosives, or mechanized drilling, and must complete a course on environmental protection from the Mines Department prior to commencing mining activity. (Cook & Healy, 2012). Furthermore, the Mining Cadastre Office manages mining land permits for large and small-scale mining initiatives. The BCMM website claims to give small scale licenses which allow Malagasy nationals to mine 256 squares of land and to sell whatever resources are extracted from the land ("Small-scale Mining Licence (PRE)," 2016). After the 2009 coup, however, the BCMM permit management process stagnated. Any treatment of mining permit applications, renewals, transformations, and transfers has been almost entirely suspended and over 4,000 applications are waiting to be resolved by BCMM (Interviewee A, personal communication, November 6, 2018).

The formal permit process laid out by BCMM does not take into account the fact that most miners are desperate to make money as quickly as possible and likely do not have the time to wait for the government to pre-approve their ASM activities, especially if they would take several months to process. Those who depend on mining to feed their families will likely forego the formal procedures unless the process is made more efficient and expedient.

Rijasolo. (Photographer). (2014). Andriamanajary working in the quarry. [digital image]. Retrieved from https://slate.com/news-and-politics/2014/02/madagascars-sapphire-frontier-town-the-hard-life-in-pursuit- of-gemstones.html

A possible concern for ASM in the future is the security of locals' land rights. So far, in terms of companies' rights to mine, the 2005 Mining Code includes Law 2007-036, which allows foreign companies to buy and purchase land. Many foreign investors have also acquired Malagasy nationality to bypass any kind of clash between Law 2007-036 and a previous law that did not allow foreigners to become landowners. The TANY Collective (2015) recorded instances of land grabs by foreign companies that resulted in evictions, loss of legal rights, and low compensation for people's homes or land, associated with other mining industries (TANY Collective, 2015). In 2015, a draft revision to the Mining Code was proposed but was ultimately turned down by Madagascar president Hery Rajaonarimampianina due to rising pressure from mining investors (Stoddard, 2017). One of the proposed amendments in the draft concerned locals' land rights. Article 1.1 of the draft legislation stated that no holder of a mining permit could extract from the land without being the land owner of the site or without having identified and informed the owner and agreed upon a lease. While this is legally intuitive, this could imply that foreign and domestic mining companies would be allowed to own land in Madagascar and could essentially

deny ASM miners' appeals to mine on the land if they wanted to. Most locals are unable to purchase land titles themselves, because they are too costly and take years to obtain. Draft Article 167 proposed that groups who illegally occupy areas and prevent permit holders from exercising their mining rights should be charged with committing a crime and should be punished with forced labor ranging from five to 20 years in addition to a fine of 15,000,000 to 150,000,000 Malagasy Ariary ($4,238- $42,386 USD). If these laws were to be applied to artisanal mining, the government could implicate many ASM sapphire miners. Although the draft was not approved, the proposal raises concerns for the future of informal miners across all industries (TANY Collective, 2015). As of now, there have been no instances of documented land grabs associated with sapphire mining (Interviewee A, personal communication, November 6, 2018).

Prevalence of Forced Labor

The data collected for this report was able to neither confirm nor deny the existence of forced labor or human trafficking connected to sapphire mining in Madagascar.

6.2 Indigenous and Minority rights

South Africa

The constitution of South Africa does not specify a particular group of people as indigenous. However, historically, the Khoisan people are considered to be indigenous (Crawhall, 1999). The Khoisan is comprised of five sub-groups: the San, Nama, Griqua, Koranna, and revivalist Khoisan groups. These groups are considered an indigenous minority that make up approximately one percent of the total population of South Africa (U.S. Department of State, 2017). Most of these indigenous groups were farmers, pastoralists, and hunters. The colonialists marginalized them, displaced them from their lands, and registered them as people of color (Crawhall, 1999). In most countries, indigenous and minority groups are vulnerable, often victimized, and subject to discrimination. This has been the case for the Khoisan in South Africa.

In addition, though white South Africans of European descent are a minority, they are not at risk of discrimination, since they tend to be wealthy and part of elite, and hold the majority of government positions (Human Right Commission of South Africa, 2015).

Indigenous/Minority Risk of Exploitation

In the course of our research, we could not find specific cases where platinum mining created risk to indigenous or minority groups. Yet, the Khoisan have been often exploited and had their land confiscated, in some case because of mining (Nigel Crawhall, 1999). In general, the indigenous people in South Africa encounter a number of challenges because of land displacement:

- The indigenous people does not have access to traditional foods such as bush food, and wild animal meat.
- They do not have access to clean drinking water and have to walk many miles to collect water.
- They lost self-esteem due to poverty, dispossession, and lack of proper identity which turned them to substantial use of drug and alcohol, and high rates of domestic violence. As a result, they are not able to provide proper attention to their children.
- They are forced to resort to seasonal jobs that pay minimum wages and are not sustainable.
- They are not literate and do not understand official languages (Crawhall, 1999).

Benefits to Indigenous/Minority Groups

Following apartheid, the new laws and regulations as well as the National Development Plan provided positive benefits to indigenous groups and other marginalized groups, namely HDSAs:

- The new constitution and laws prohibit discrimination based on race, caste, gender, religion, and language.
- Indigenous people and the marginalized black majority secure a better chance of working in mining industry, especially because of the BEE act: 50% of senior level positions in the industry must now be held by black persons.
- The indigenous people and black majority have reclaimed their identity.
- The children of indigenous people and marginalized black majority are able to attend school.

- The indigenous people claimed their land based on the new laws (Crawhall, 1999; BBBEE, 2018).

Madagascar

We define indigenous groups as native peoples and ethnic groups who are the original inhabitants of a given region, in contrast to groups that have settled, occupied, or colonized the area more recently ("Definition of Indigenous Peoples," n.d.). By those standards, there is only one group that fits the legal definition of an indigenous group: the Mikea people (World Bank, n.d.). They are recognized to be a small, culturally distinct population of forest foragers (Huff, 2012). However, we could not confirm whether this group is associated with sapphire mining. Based on several experts' accounts, most communities in Madagascar identify themselves as Malagasy and do not view themselves separately from that identity (Interviewee A, personal communication, November 6, 2018).

Indigenous/Minority Risk of Exploitation

Out of the 18 existing ethnic groups in Madagascar, the Bara community, who live in southwest Madagascar, has experienced some conflict due to gem mining (Lawson, 2018). The Bara considers certain park grounds around their community to be sacred and regard miners' digging of sapphires in those areas as an insult to their ancestors. Women in Bara communities may be most affected, as they culturally have few rights to own land (Lawson, 2018). This implies they may not be able to own land near mining areas and profit from mining directly without the involvement of a husband or a male relative. This speaks to a larger legal and cultural issue of women's rights that goes beyond the industry.

In Ambondromifehy, which at one point experienced a surge of sapphire miners, the tompontanana, or "people responsible to/for the community," who presided over the area prior to the 1996 rush, were unhappy with the young male miners' attitudes and treatment of the community. The locals saw miners' activities as improper, since the miners transgressed local taboos and disregarded the well-being of the community. Locals were distrustful and cautious of migrant sapphire miners who, in their opinion, often encroached on their relatives' cave-tombs. Although these sacred sites were meant to be open to all and visited frequently, locals preferred for some spaces to remain sacred and untouched by those whose family lineages were not

connected to these sites. In their view, the miners' temporary status in the region did not create a culture of "giving back" or enhance the conditions of the existing community (Walsh, 2006).

Benefits to Indigenous/Minority Groups

Despite local taboos, sapphire rushes often present residents with opportunities to benefit indirectly, because such quickly growing towns create the need for more food stands, laundering businesses, and services that people generally need to survive in an area. Typically, local women can provide those services to the miners (Walsh, 2003). Long-time residents of towns such as Ambondromifehy often feel that they have the right to engage in mining or business around mines since they are the ones who have tended to the lands for generations (Walsh, 2006). Residents' dichotomous feelings between protection of sacred spaces and engagement in this booming industry are complex and not static.

Heightened Rates of Risk

A more general issue affecting all mining communities is the surge of young irresponsible men appearing around mining sites and nearby communities. Often, the men engage in sexual activities with young girls from the Bara and other ethnically-distinct communities, introducing sexual activity to them earlier than would have occurred otherwise. This can lead to girls dropping out of school due to unplanned pregnancy, exposure to and spread of STDs, among other detrimental consequences (Cook & Healy, 2012).

Different communities will have varying perspectives of sapphire mining and encroachment on their claimed land; therefore, there is always a possibility that tensions could arise between the local populations and migrant miners, not unique to sapphire mining.

6.3 Women's Rights

South Africa

The Constitution of South Africa promotes women's rights to work without any discrimination on the basis of gender, race, color, pregnancy, sexual orientation, marital status, religion, language, and birth in South Africa (The Constitution of South Africa, 1996). Similarly, the Employment Equity Act provides fair and equal opportunity for women to be considered for employment at equal wage with men (Employment Equity Act, 1998). The government of South

Africa further empowered women through the Protection from Harassment Act which ensures that all work environments, both private and public sector, shall be free from any types of violence against women or children (Protection from Harassment Act, 2011).

On the one hand, the platinum mining industry has brought positive impacts in the lives of some women. However, it has also negatively affected the living conditions of other women. The details of these positive and negative implications of platinum mining on the lives of women are explained below.

The Risk of Violence Against Women

As explained in an earlier section, platinum mining is a labor-intensive and relatively hazardous profession which requires physical strength to drill holes into rock, enter deep-wheels, and operate in a noisy and dusty environment. Despite the existing laws and regulations which promotes gender equality in the workforce, most mining companies give priority and preference to recruiting men over women. As a result, the staff responsible for recruitment in some mining companies having recruited women for both unskilled and skilled jobs in return for sexual favors (Human Right Commission of South Africa, 2015).

The findings of a survey conducted by the University of South Africa also showed that the working environment in platinum mines is not hygienic for female workers who have gynecological problems. However, considering the high rate of poverty and unemployment in South Africa, it is difficult for female workers to find an alternative employment. Therefore, some women take the risk of working in such a hazardous work environment to put food on the table. Some women also seek economic opportunity by taking up prostitution in mining towns, since the majority of miners are migrant men and live far from their families (Human Right Commission of South Africa, 2015).

Since the majority of people in the rural areas are dependent on farming and animal husbandry, their displacement due to platinum mining outweighs the benefits. They are always the most vulnerable stakeholders of mining projects, but neither the government nor the contracting companies provide them with sufficient compensation packages in terms of land and cash assistance for resettlement. In 2008, ActionAid International conducted an impact evaluation on the Anglo Platinum in Limpopo, South Africa. The finding of studied showed that women of

rural areas are the main victims of LSM, because mining projects disrupt their ability to earn income through agriculture (Curtis, 2008). Many living near platinum mines fear loss of agricultural and grazing land, contaminated and cut off water supplies, the rise of community protest and violence, pollution from blasting operations, and forced relocation without proper compensation (Curtis, 2008).

Existing law does not ensure rural women's socio-economic benefit: they are completely neglected when the representatives of mining companies negotiate the resettlement compensation and benefits. The representatives of mining companies only negotiate with men about the resettlement and compensation. These men tend to spend a substantial amount of their income on alcohol and drugs. Since women are the most vulnerable stakeholders in this case, Section 21 of the law, which requires resettlement compensation, should specifically entitle women's compensation and empowerment to negotiate equal to men. (Curtis, 2008)

Economic Opportunities

The platinum mining has also had positive impacts in the lives of women either directly employed by the mining companies or who have spouses working in the mining companies. One expert stated that about 80% of machinist work in mines, i.e., high skill labor, is performed by women (Interviewee G, personal communication, November 11, 2018). The DMR has also set a target of 10% women's employment in the mining industry through the MPRDA act, and a target of having 50% and 25% black men and women, respectively, on mining companies' boards of representatives (PWC, 2017). However, some of the experts interviewed for this report were not satisfied with these economic reforms. One stated that the new reform is merely a symbolic requirement for mining companies, and often only politically-connected black persons are employed in high- level positions. As a result, a new black elite has emerged (Interviewee N, personal communication, November 12, 2018). As a whole however, according to an annual review of the mining industry conducted by the Chamber of Mines in South Africa, the statistics look mostly positive: approximately 53,179 women are working in mining industry in 2017 as compared to 11,400 women in 2002 (Chamber of Mines in South Africa, 2017).

Madagascar

Most of the sapphire diggers are male, but females often participate as intermediaries between miners and buyers, or they provide other services for diggers such as sieving, cooking, and separating and packaging the stones. Women are perceived to be more reliable and dependable with the stones, which is why they are more trusted as intermediaries than young men who engage in conspicuous activities (Interviewee A, personal communication, November 6, 2018).

The Risk of Violence Against Women

The abundance of money near mining areas has engendered prostitution. In Ilakaka, women working as prostitutes in brothels migrated from other areas to benefit from the fast consumption. Some reports cite Antisranana and Ambilobe as the two principal towns from which girls travel to participate in sex-related work (Cook & Healy, 2012). The spreading of STDs has been typically documented more among young girls and newer participants in the business, who are not as aware of the potential risks involved, compared to the more experienced prostitutes who use contraceptives. Cook and Healy (2012) qualify this phenomenon by pointing out that the mining rushes do not lead to an increase in the number of females taking up prostitution, but rather draws in females who were already prostitutes in other regions. The spreading of STDs could in turn affect spouses of miners when the men return home. Some communities have begun to combat the negative health effects of this development. Local clinics in Commune Anivorana Avartra have worked with the Marie Stopes International STD prevention program to address the issue (Cook & Healy, 2012).

Women's economic vulnerability leads some to enter into undesired relationships with miners in the hopes of accessing more income or gaining savings for future ventures. Through these types of transactional relationships, male miners often will give women raw materials to sieve in exchange for sex. This phenomenon is called "vaid saffira," or sapphire marriages. The marriages do not provide legal benefits to women, meaning that they cannot own land or property through such social contracts (Weldegiorgis, Lawson, & Verbrugge, 2018). Most women situated around mining areas have a difficult time accessing the sapphire industry compared to their male counterparts. Sometimes women are not allowed to run a sapphire trade independently, and instead have to depend on their male family members or a spouse to participate in sapphire income generation. A female gem trader in Southwest Madagascar

described how she could only use a male relative's phone to conduct transactions if he was present. In some cases, women and children would only be allowed to re-sieve mining areas after the best quality stones were already extracted. Even then, women would be expected to give their stones away to male relatives. The male diggers conduct business with men in power, such as police chiefs and the town mayor, while the women are not afforded the same privileges (Interviewee D, personal communication, November 4, 2018). These cultural beliefs reflect upon a broader gender inequality and unequal access to land ownership in Madagascar (Weldegiorgis, Lawson, & Verbrugge, 2018).

Economic Opportunities

Despite of some of the mentioned setbacks, there is still reason for optimism. If sapphire mining becomes an inclusive industry that involves women and gives them broader access to both ASM and LSM, this would benefit the overall economy. Women's "cool money" consumption can help families and communities make long-term investments (Walsh, 2003). Some women's motivation to make it big in the sapphire industry stems from cases of abuse by spouses or family members (Lawson, 2018). Women without husbands are also motivated to become financially stable because they have to rely on one income source to raise their children.

Lawson, L. (Photographer). (2017). Women in Madagascar learning how to use basic gemmology equipment to identify their stones. [digital image]. Retrieved from https://www.sustainablegemstones.org/blog/2017/10/12/signature-project-2-gemmology-and-lapidary- for-women-in-south-west-madagascar-1

Lawson (2018) recorded several cases in which sapphire mining had a positive impact on women's lives in Madagascar. She found that some women worked for a "boss" who compensated a group of three women with 10,000 Malagasy Ariary ($2.88 USD) in three days. Some women, who have engaged in sapphire mining independently, found sizable stones, which allowed them to purchase cattle or homes. Others were able to leave their abusive husbands (Lawson, 2018). Furthermore, Lawson conducted a baseline study in the Atsimo Andrefana region, in the town of Sakaraha, of women involved in mining. These women participated in a basic field gemology course, which Lawson started with two other experts. The women received basic supplies, a guide book, and training on the beneficiation of various stones. The women were asked to identify the qualities of the stones and were assisted by a gemstone cutter. The course also addressed health and safety issues related to cutting the stone, which without proper face protection could engender silicosis-- an occupational lung disease (Levers, 2018). Lawson

measured the impacts of the program a year later, and found that women successfully applied basic lapidary skills and had made simple jewelry, which could be sold on the market. The same type of training can be applied to sapphire beneficiation. If implemented, women could have a real stake in the ASM industry (Lawson, 2017). This kind of capacity building can be used to help women negotiate with sapphire buyers, which would ensure they receive a payment amount equal to what men selling sapphires receive (Interviewee D, personal communication, November 4, 2018).

6.4 Children's Rights

Much of what concerns the rights of children involves their participation, forced or otherwise, in labor. The ILO defines child labor as work that deprives children of their childhood, their potential and their dignity, and that is harmful to physical and mental development. The ILO also states that what can be considered "child labor" varies given the child's age, the type and duration of work, as well as the conditions under which it is performed. These contextual factors determine whether a particular activity involving the participation of children should be targeted for elimination (ILO-IPEC, n.d.).

South Africa

The government of South Africa has enacted domestic laws as well as ratified the United Nations Convention on the Rights of the Child (CRC) to protect children from any forms exploitation and abuse. National programs empower the families of children in poverty and ensure children receive free basic education; these programs include social grants for child support, care dependency, and foster care (SAHRC, 2009). Yet, children in South Africa are not safe from trafficking, sexual exploitation, and forced labor: approximately 557,000 children were employed in some forms of work including forced begging in 2015 (US Department of Labor, 2017).

Violence Against Children

As per our research and interviews for this report, we did not find specific data and information related to any cases of trafficking, sexual exploitation, or child labor in the legal platinum industry in South Africa. There have been some reports that children were forced to work in illegal mines without wages, and that some of them became victims of sexual exploitation (U.S.

Department of State, 2017). However, this report cannot strongly confirm or refute the presence of child labor in illegal platinum mining operations.

On a broader scale, there have been cases of children indirectly benefiting from the platinum industry, and cases of children being negatively affected. Since the poverty and unemployment rates in South Africa are relatively high, children benefit when their parents have the opportunity to earn income by working in the platinum industry. A stable income means a stable and secure place to live, a sufficient amount of food, and the opportunity to go to school. Yet, cases of involuntary or voluntary displacement from land and farmland or even having a mine near to a community can potentially affect children's access to food and clean water, disrupt their schooling, or pollute their living environment due to the noise of blasting operations or the blockage of roads (Curtis, 2008; SAHRC, 2015).

Protection from Danger

The government of South Africa has ratified the United Nations Convention on the Rights of Child (CRC), which protect all children age of eighteen years or below from any form of sexual exploitations, abuse, and forced labor. Likewise, the government of South Africa has enacted laws and regulations to protect children and provide them a safe environment to live. In Chapter 2, Section 28 of the constitution, which ensures the rights of children, the government of South Africa enacted a number of other bills that protects children as well as their parents from dangers. These bills include the Protection from Harassment Act, and the Basic Conditions of Employment Act (CRC 1990; The Constitution of SA, 1996).

Attention to Developmental Needs

As mentioned in the previous section, communities' voluntary and involuntary displacement from land due to platinum mining can negatively affect children. In most cases of displacement, children's nutrition, health, and education were negatively impacted. As per a study conducted by ActionAid International in 2008, children living in Ga-Molekane village, which is very close to a platinum mine, frequently complained of diarrhea and stomach aches: it is suspected that the water supply has been contaminated by mining activities. In another case in Limpopo, children could not attend school, because the school had to be relocated to a remote location 15 kilometers from the village to make way for a new platinum mine; the children there are now

dependent on a bus service provided by the mining company (Mark Curtis, 2008). Though communities are compensated for their displacement, more could be done to decrease communities' risk in terms of human health, children's education, and access to clean water following displacement or the digging of new platinum mines near villages.

Madagascar

Varying levels of child labor are widespread across all industries in Madagascar. It is estimated that approximately 32% of children work (Heywood, 2007). NGOs in Antananarivo, Antsirabe, and Toamasina have received children who were victims of human and sex trafficking and forced labor. Some reports suggest child sexual exploitation is most common in tourism areas and formal and informal mining sites (U.S. Department of State, 2017). The exact number of exploited children as related to sapphire mining is unclear at this time.

Those children who are asked to extract sapphires from the mines are typically 16 and older, which means very young children are not being asked to enter the tunnels (Interviewee D, personal communication, November 4, 2018). However, children as young as 10 do participate in the sieving and other aspects of the mining process. The areas which have been found to use children for sapphire mining are Analamanga, Anosy, Ilakaka, and Vakinankaratra (U.S. Department of Labor, 2017).

Schmidt, R. (Photographer). (2008, September 14). A young miner holds on tight to a rope as he is lowered into a deep hole in the ground in a field in Anzanakaro near Ilakaka, Madagascar on September 14, 2008. Local miners and many of their family members work deep narrow holes where they scrape gravel and sand in search of sapphires. [digital image]. Retrieved from http://archive.boston.com/bigpicture/2008/10/the_sapphire_mines_of_madagasc.html

Protection from Danger

There are two primary reasons children are brought to mines: (1) they are actually participating in mining activities, or (2) their mothers bring them along to the mines so that they can simultaneously mind their children and work. The children who mine are able to reach narrower places in the tunnels, which are difficult for adults to access. As with adult miners, accidents do occur, where children are sometimes killed by landslides or collapsed tunnels. These types of incidents have been recorded in Antsiranana and Vatomandry in northern and eastern Madagascar (Duffy, 2007). Children are also susceptible to suffering from respiratory issues and contracting diseases such as diarrhea and malaria (U.S. Department of Labor, 2017).

At a mining rush site near Bemainty, very small amounts of child labor have been observed in

comparison to the entire population that participated in sapphire mining. At this site, children worked on reinforcing mines' mud walls controlling water flow and carried loads and goods to the mines. The children did not appear to be forced into these activities, but were rather working to earn extra cash (Interviewee L, personal communication, October 25, 2018).

Children's participation in mining might also reflect the broader vulnerability and poverty of families, and their desire to diversify means of income. In one recorded case, a woman, her husband, and their three children wanted to do everything they could to bring in income from multiple sources, which in their case were mining, rice growing, and cattle raising. Due to increased security risks to locals, women must also spend money on their families' protection by purchasing guns. As a result of unsafe circumstances, some women do not want to send their children to school (Lawson, 2018). A potential way to address children's engagement in sapphire mining would be to build capacity for the entire family instead of focusing on children's agency as a separate issue (Interviewee D, personal communication, November 4, 2018).

Rijasolo (Photographer). (2014). Andriamanajary and his 11-year-old son, Solo, en route to the quarry. [digital image]. Retrieved from https://slate.com/news-and-politics/2014/02/madagascars-sapphire-frontier-town-the-hard-life-in-pursuit-of-gemstones.html

Attention to Developmental Needs

Since so many families migrate to participate in mining, children's education is often put on hold. For miners who work in more remote areas, distance makes it difficult to send children to school, since the closest school might be days' travel away from the sites. There is a large urban and rural divide in education. Generally, there is a three percent graduation rate at the upper secondary and tertiary education levels (Interviewee A, personal communication, November 6, 2018). This does not mean that parents do not want their children to receive an education; the more critical reason for children's participation in income-generation is deep poverty (Heywood, 2007). Additionally, children's participation in the mining industry must also be considered in light of the national context. Over one third of all Malagasy women are mothers by age 18 and most Malagasy children who start school quit between grades 3 and 6 because there is limited infrastructure and staff capacity to extend schooling past those grades (Interviewee A, personal communication, November 6, 2018). Staffing shortages occur when teachers leave their professions to pursue artisanal mining (Associated Press, 2017). Most teachers in rural areas also do not achieve a high level of education and therefore have difficulty teaching curricula to students. All of these factors contribute to the difficulty of building a culture of education, especially in rural Madagascar (Interviewee A, personal communication, November 6, 2018).

Children's participation in sapphire mining does not generally seem to be forced or be of mental or emotional harm. Physical harm or death occur as the result of tragic accidents rather than forced labor. Whether deliberate or not, mining rushes are certainly affecting children's education and safety.

6.5 Freedom from Violence

South Africa

Though the platinum mining industry generates revenue for the economy of South Africa, the mining projects are often intertwined with cases of discontent from the potentially affected stakeholders, workers, and unions. Some protests staged by miners or affected mining communities have become violent in the past (Curtis, 2008; SAHRC 2015). During the Marikina protest, 34 protesting miners were killed by police. In other instances, the legacy of apartheid has

surfaced and black miners have been referred to as animals and killed by corrupt police officers (Odeku & Odeku, 2015).

Cases of forced displacement have also been reported. 7,000 residents of the Ga-Pila village were forced to leave their village without prior notice to make way for a mine. When the people attempted to conduct community protests, the police beat and injured most of them (Curtis, 2008). In another case, around 150 villagers in Maandagshoek came together to demonstrate against blasting operations nearby in June 2006, and police arrested all of them and shot them with live and rubber bullets (Curtis, 2008). Cases of violence in response to protests have emanated from the South Africa government through the police, but protests could potentially have been mitigated if more care were taken by mines of the communities that live in close proximity to their operations.

Most of the experts interviewed for this report stated that cases of violence in the platinum industry have decreased significantly in the last few years. The government has passed many regulatory bills to reform maladministration and malpractices in the mining industry. One expert reported that workers and unions protest and strike to negotiate their wants from the mining companies, but almost all of these protests and strikes last two days on average and are managed peacefully (Interviewee N, personal communication, November 12, 2018).

Madagascar

Since artisanal sapphire mining is mostly conducted informally, the way stones are traded and exported onto the global market has a risk of generating conflict that could turn into violence. The unregulated nature of the business engenders risk to miners and other stakeholders' safety and security.

It is unclear to what extent the Malagasy government has taken measures to secure mining rush areas. In Antananarivo Carriere, the mines are guarded by gendarmes who claim to be sent from the district capital Ambatondrazaka to keep order at the site on a monthly basis. The gendarmes' general attitude towards the government is that officials do not care about what happens at the mining sites. The gendarmes say they receive no support from the government to control the sites. Due to the lack of oversight, the gendarmes charge miners an entry tax of either two cups rice or 5,000 Malagasy Ariary ($1.50 USD), which is a considerable amount of money when comparing the fee to miners' daily wages (Interviewee L, personal communication, October 25,

2018). In the town of Isalo, the national army and police were asked to guard national park boundaries to keep miners out, resulting in tensions that amounted to racketeering and corruption from the police and army officials (Interviewee M, personal communication, November 13, 2018). Sometimes police or army personnel who guard the mines threaten to stop guaranteeing miners' safety if they do not pay entrance fees (Le Monde, 2016). This type of regulation mechanism creates uncertainty and depreciates miners' feelings of safety.

Larkin, Jason.(Photographer). 2014. Gathering for the Anniversary of the Marikana Massacre. Copyright of Jason Larkin from album "Tremors Below." Used with Permission.

Bars and brothels frequented by diggers can become a source of violence at night as alcohol has an influence on young male miners' behavior. This type of behavior is common across other industries as well. Armed violence has become common, facilitating the flow of various types of pistols and assault rifles into the area along with locally made weapons. There are several accounts that describe how the increase in weapons impacts sapphire mining stakeholders. Some Malagasy citizens take advantage of the opportunity and work as bodyguards for foreigners. In

Ilakaka, trained Malagasy military and police offer their expertise in the protection business and receive housing and around $60 USD per month for their services (Small Arms Survey, 2015). To deal with conflict caused by these factors, in 2016, the government imposed a 9 p.m. curfew in Ilakaka and announced it would attempt to close down some of the bars that appeared as a result of the booming business (Le Monde, 2016). It is unclear whether the Malagasy government attempted to institute these policies elsewhere.

The most common instances of violence manifest through the widespread insecurity in towns near mining areas. The rushes, which bring in thousands of workers, create challenges for local people residing near the mines. Insecurity is often exacerbated by thieves and con-men who travel to the areas from urban regions and steal from locals' and miners' residences. Cases of this occurring have been recorded in Antetezambato and near Didy, which saw three home invasion attacks at the beginning of the rush, resulting in hospitalization of the victims (Cook & Healey, 2012). Furthermore, between December 2016 and April 2017, it was reported that eight people were murdered in Didy (Associated Press, 2017). For miners in temporary living conditions especially, it is easy for thieves to steal their valuable gemstones if they are not well protected or hidden inside the makeshift tents/huts. In another case, in 2016, Bemainty's residents saw some of this destruction. After a nearby mining rush commenced, bandits attacked the village, stole valuables, and killed the traditional chief. This forced villagers to flee into the rainforest, including the only schoolteacher. The villagers then experienced a second wave of violence, when miners who ran out of money repeated similar offenses (Interviewee L, personal communication, October 25, 2018).

Armed gangs of cattle rustlers called the Dahalu affect miners and nearby communities, although they are not involved with sapphire mining directly. The Dahalu engage in acts of violence in the Southern region of Madagascar referred to as "Zone Rouge." Since their formation, they have increased insecurity for all by stealing people's cooking and mining supplies. However, they typically do not take sapphires, since they do not have access to the right buyers. The common narrative across all of these cases is that the government has done very little to help improve security in sapphire mining areas and beyond (Interviewee A, personal communication, November 6, 2018).

Chapter 7: Supply Chain Governance

7.1. Supply Chain Governance and Value Chain Upgrading

Definition and relevance

In examining the most effective mechanisms to affect positive change in the extraction, manufacturing, sale, and purchase of precious minerals, it is important to highlight the difference between supply chains and value chains, and how the structuring and analysis of both has different implications for the potential success of changing those frameworks to improve and protect human security. Value chains refer to the process by which a raw material has value added to it via, e.g., extraction, manufacturing, and marketing for consumers (Porter, 2015). On the other hand, supply chains refer more specifically to the transport, handling, warehousing, and logistics of bringing that raw material from extraction to the end consumers at the right time, to the right place, and in the form of the right product. Supply chain management constitutes a part of the value chain for a given product. By analyzing the more tangible, physical supply chains, who has power over which part of chain to make decisions about human security becomes evident. This power is referred to as supply chain governance, and has critical implications for the effectiveness of both internal and external improvement mechanisms. The analysis of the value chains of precious minerals also has important implications, which are related to the ability of a nation or region to improve their respective industries, specifically as it applies to beneficiation strategies. In this analysis, focus is placed on the possibility of social and or economic upgrading in value chains and governance power in supply chains.

Supply Chain Governance

Supply chain governance occurs on two levels, vertical and horizontal. Vertical supply chain governance refers to the balance of power in an entire global supply chain, from the original extractors, to final manufacturing and sale to the end consumer. The governance of this supply chain tends to be overseen by international actors, such as the International Labor Organization. Horizontal supply chain governance refers to nationally oriented governance of a supply chain, such as national firms or a national government. In any given industry, supply chains may be simultaneously governed vertically and horizontally, or one level of governance might be

stronger, weaker, or absent in comparison with the other. (Sturgeon et al., 2005; Gereffi et al., 2016)

Types of Values Chains

According to Sturgeon et al. (2005), five types of global value chains exist. These types differ based on three factors: (1) the complexity of information and knowledge transfer required; (2) the ability of the required knowledge and information to be codified; and (3) the capabilities of actual and potential suppliers. Each of these three factors are ranked either high or low, and the combination results in the types of global value chains illustrated in Figure 10: market, modular, relational, captive, and hierarchy.

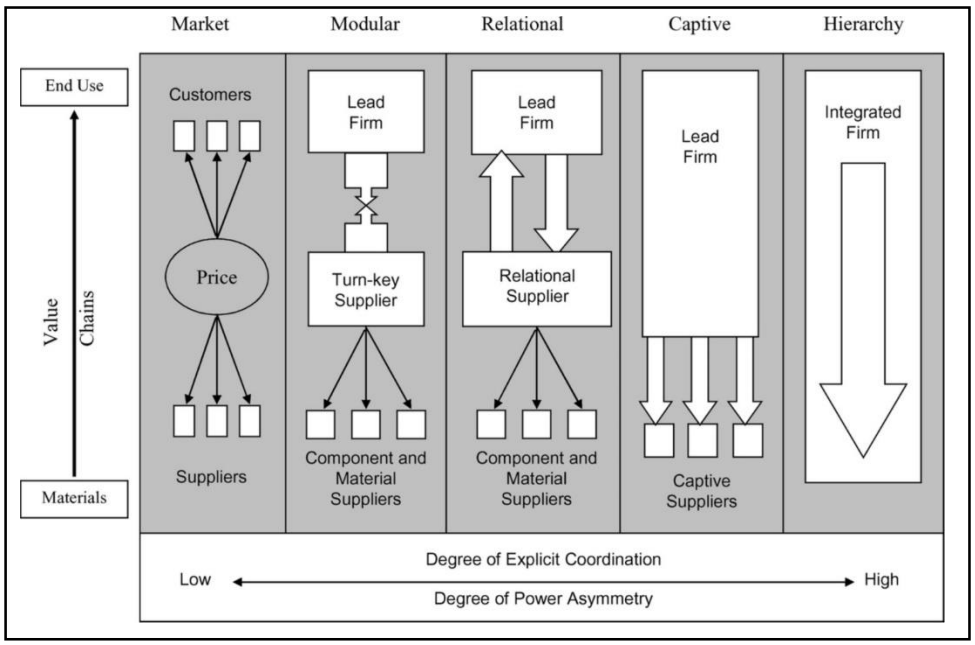


Figure 10. Types of Value Chains.
Source: "Governance of Global Value Chains," T. Sturgeon, 2005
Review of International Political Economy

Each type of value chain has a different level of explicit coordination and power asymmetry between actors.

Market

A market type value chain has a low complexity of transactions, a high ability of codifying transactions, and high capabilities in the supplier base. This results in a low degree of power

asymmetry between actors, and low degree of explicit coordination. In a market type chain, buyers and sellers typically have an equal level of power and influence over the other actors, meaning that the cost of switching to alternate buyers or sellers is low and the market is competitive. This high level of competition means that prices primarily dictate the market.

Precious gem or mineral value chains are typically market type: a raw material is sold to a buyer, but it is easy for buyers and sellers to switch transactional partners because the product bought and sold is undifferentiated. Price is the key factor in choosing buyers or sellers. As a result, in the precious gem and minerals industries buyers and sellers have long or short term contracts with each other to increase the cost of switching transactional partners. In this way, they ensure profit and protect themselves against the price whims of the competitive market.

Modular

A modular type value chain refers to a chain where sellers produce modular products, i.e., products that are customized to a certain degree for a specific buyer: the seller makes a modular product up to certain specifications for a certain buy, but maintains some flexibility. In this type of chain, transactions have a high complexity and are highly codifiable, and the supply base is highly capable. This translates to a medium to low level of explicit coordination and power asymmetry between actors in the value chain.

Relational

A relational value chain refers to a chain where buyers and suppliers are mutually dependent on each other. In this case, the complexity of transactions is high, and difficult to codify. Power between the buyers and suppliers is relatively equal, and the level of coordination required is high. This means that the cost of switching transactional partners is high for both parties.

Captive

In a captive value chain, products and transactions are complex, but the supplier base has low capabilities. Small suppliers are reliant on buyers, and produce only simple products which large lead firm buyers add higher value to. Lead firm buyers tend to dominate the market, holding the weaker suppliers captive in their value chain. In this case, the lead firm buyers hold most of the power.

Hierarchy

In a hierarchy value chain, one entire firm manages and operates the entire chain. This usually occurs when it is difficult to codify product specifications, so the firm cannot find suppliers capable of meeting their needs, and produce in-house instead. The entire value chain is vertically integrated.

Upgrading Value Chains to improve human security

Depending on the power asymmetry in the value chain, different mechanisms for improving human security might be effective. There are two different types of upgrading, social or economic. Precious gem or mineral value chains, like those originating in South Africa and Madagascar, might pursue different paths to or types of upgrading, depending on their governance structures. (Sturgeon et al., 2005; Gereffi et al., 2016)

Paths to social upgrading

In social upgrading, actors in the value chain, such as mining firms or jewelry manufacturers, maintain their location in the chain, but improve factors which contribute to the social wellbeing of those participating in the chain, such as miners. This includes improving working conditions, increasing pay, or improving safety or environmental standards. There are six paths to social upgrading.

Market driven path

In a market driven path, companies seek to differentiate themselves in the market by producing products according to high ethical labor standards. This can be an effective path when consumers are actively concerned, aware, and willing to pay for ethically produced products. However, this path hinges on consumers' actions, and critical masses may not be reached which make this strategy economically viable for companies to continue.

CSR-driven path

In a corporate social responsibility (CSR) path, global buyers (companies) demonstrate an explicit commitment to social upgrading, and implement higher standards of ethical production, which they then also require of their suppliers. In this case buyers typically issue standard codes of conduct, which suppliers must adhere to or risk losing the business of the buyer. This kind of path is effective when buyers have more power than suppliers, as in a captive value chain.

Multi-stakeholder path

In a multi-stakeholder path, non-governmental organizations (NGOs), private firms, and public governments work together to improve productions standards. In this case, NGOs can help to set the standards and provide independent monitoring and evaluation, private firms can provide insight for practical implementation, and government can enforce standards across an industry.

Labor driven

In a labor driven path, workers demand improved conditions and standards. This can be in the form of unions or protests.

Cluster driven

In a cluster driven path, firms working at the same level in the value chain in the same region work together to set improve standards. By working together, the firms lower the cost of complying to improved standards, and create a cluster "culture" which respects ethical production standards.

Public governance path

In a public governance path, the government sets standards and regulates them through law. This path is dependent on the government having vested interests in improved conditions, and being willing to accept the economic consequences if firms choose to go elsewhere, i.e. other countries, to avoid the cost of compliance.

Paths to economic upgrading

Value chain actors can also seek to upgrade to a higher value adding location in the chain. For precious minerals, this would be referred to as beneficiation. The closer to the consumer a value chain actor is, the more profit they tend to reap as their actions add the most value to the good being produced. For example, mines are low on the value adding chain compared to craft jewelry manufacturers. A lump of platinum is not valuable to a consumer until it is crafted by highly skilled workers into a precious ring or necklace. Economic upgrading can provide higher paying jobs and greater profits, but it is difficult to achieve. There are four types of economic upgrading:

- Process upgrading: Improvement in the production to increase productivity;
- Product upgrading: Occurs when there are more specific product variants;

- Functional upgrading: Firm move activities to more higher value added tasks;
- Chain upgrading: Shift of the whole value chain to a more advanced technology. (Sturgeon et al., 2005; Gereffi et al., 2016)

7.2 Platinum Supply Chains in South Africa

There are currently about 38 companies that own platinum mines in South Africa. The largest of these by far are Anglo American (12 mines), Implats (eight mines), Sibayne Stillwater (eight mines), Lonmin (seven mines), and Sedibelo Platinum Mines Ltd. (five mines) (Platinum Mining in South Africa, 2018). The operations of these large companies include mineral exploration, mining, concentration, and refinement of platinum. Once the platinum has been refined, it is sold in this raw form to jewelry manufacturers, a large share of whom are located in China, Japan, and the U.S. (Interviewee E, personal communication, November 7, 2018). These manufacturers craft the raw platinum into jewelry, and then distribute it to their own retailers.

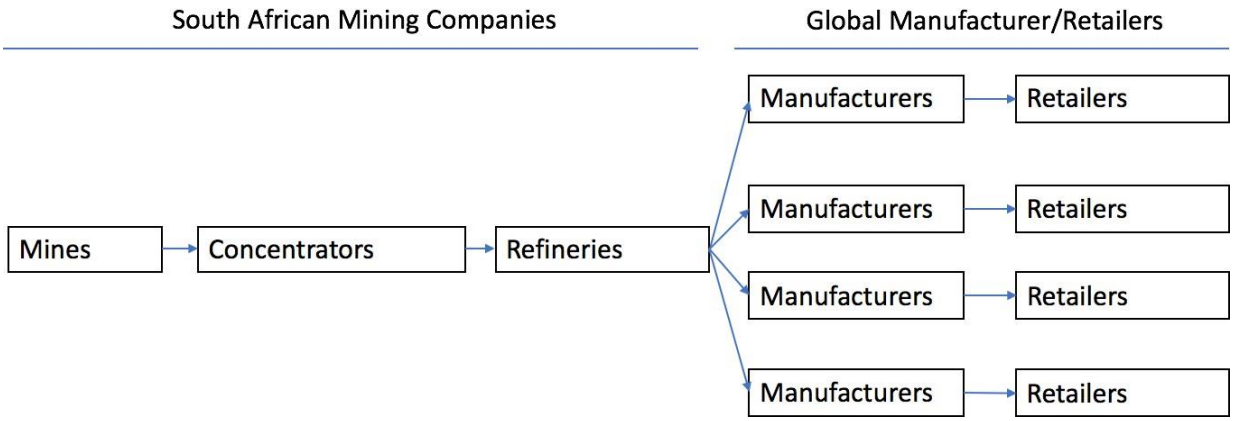


Figure 11. Platinum Value Chain.
Source: Authors.

In this industry value chain, the South African mining companies are “commodity suppliers” to a plethora of global jewelers, i.e., while platinum varies in its quality level, for the most part the product is the same and no customization is necessary on the part of the mining firms. This means that the switching cost between buyers and sellers is low. Buying and selling between the mining firm suppliers and the manufacturing and retailing buyers is often done via long or short term contracts. When a seller cannot meet the demand of the buyer as both parties have agreed

via contract, the seller sometimes buys raw platinum from other mining firms, combines it with their own in a smelting process, and then sells it on to the buyer. Explicit coordination between buyers and sellers is relatively low, and their relationship is based mostly on price.

Given the difficulty that South Africa has had in developing beneficiation on a local level, and moving higher value added activities to South Africa, functional economic upgrading may be out of reach for this industry. However, this does not exclude other forms of economic upgrading, or social upgrading, and certain conclusions about the best mechanisms with which to intervene for positive development can be gathered based on the industry's market governance structure.

- **Market driven path**: Human rights and environment issues pertaining to platinum and platinum mining in South Africa are largely unknown to the public and consumers. It would take a well-coordinated and large campaign to raise the public awareness necessary to induce improved value chains via consumer pressure.
- **CSR-driven path**- Jewelers do not have much influence on platinum mining firms. If one Jeweler implemented a CSR code of conduct, the mining firm could switch easily to another manufacturer. It would have to be broad scale movement.
- **Multi-stakeholder path**- The government in South Africa seems to work closely with and support the mining industry. However, any kind of civil society movement does not seem to be strongly present.
- **Labor drive**- This seems to be an effective and present mechanism. However, it often associated with violence, and protesters have died.
- **Cluster driven**- Collective action would lower the cost of compliance, but whether or not there is a will in place to do this is unknown. The mining companies all seem to have codes of conduct, which may be driven by legal regulation and the need to appeal to Northern shareholders.
- **Public governance path**- The South African government has become increasingly involved in the strict governance of the platinum mining industry. This is evident in the continual improvement of the Mining Code. In this case, because South Africa has the majority of the world's platinum supply, increasingly strict regulations to reduce the risk

to human security are a good option for inducing social upgrading: mining firms cannot leave South Africa in response to regulations.

7.3 Sapphire Supply Chains in Madagascar

Madagascar's sapphire mining industry operates under a dualized supply chain, consisting of licensed and unlicensed trade and export of the precious gems.

Informal Supply Chain

The main difference between the informal and formal supply chains is that in the informal supply chain, stones bought by gem traders are transported out of Madagascar without proper documentation required by the Malagasy government. It is estimated that Sri Lankan traders control about 70% of the market (Lempriere, 2018; Associated Press, 2017). Some of these foreign dealers traffic the sapphires out through airports or by sea, and are typically helped by persons working in the government, local businesses, or the customs department, presumably for a cut of the money (Duffy, 2005). Since sapphires are easy to smuggle and government workers are paid little, they can be easily bribed to take the stones out of Madagascar illegally (Interviewee C, personal communication, November 13, 2018).

Politically connected persons involved in sapphire mining often conduct sapphire transactions in criminal ways, i.e., without permits or through forced expulsion. However, their attempts often fail due to exposure or opposition from local populations and miners. Between 2017 and 2018, the president's son allegedly traveled to a mining area with equipment in an attempt to mine sapphires, but the local community protested against his presence. Although he was unsuccessful, this may not be the first time that government officials have tried to illegally profit from the industry (Interviewee A, personal communication, November 6, 2018). To deal with the informal export of sapphires by foreign buyers, in 2012, the Malagasy government arrested and deported some Sri Lankan gem traders. However, it is likely that nothing has been done to punish Malagasy government officials involved in the informal supply chain, since government elites are the ones who often benefit from the shadow supply chain (Associated Press, 2017). Furthermore, excessive governmental red tape hinders the legal export of sapphires from Madagascar, which is largely the reason why so many exporters are not keen to engage in the legal process. The stones are only recorded in the international economy once they are sold on

the global market and become legitimized as a commodity (Duffy, 2007). Sometimes foreign buyers do not declare high value gems and only legally declare low quality gems, while smuggling out the rest (Cook & Healy, 2012).

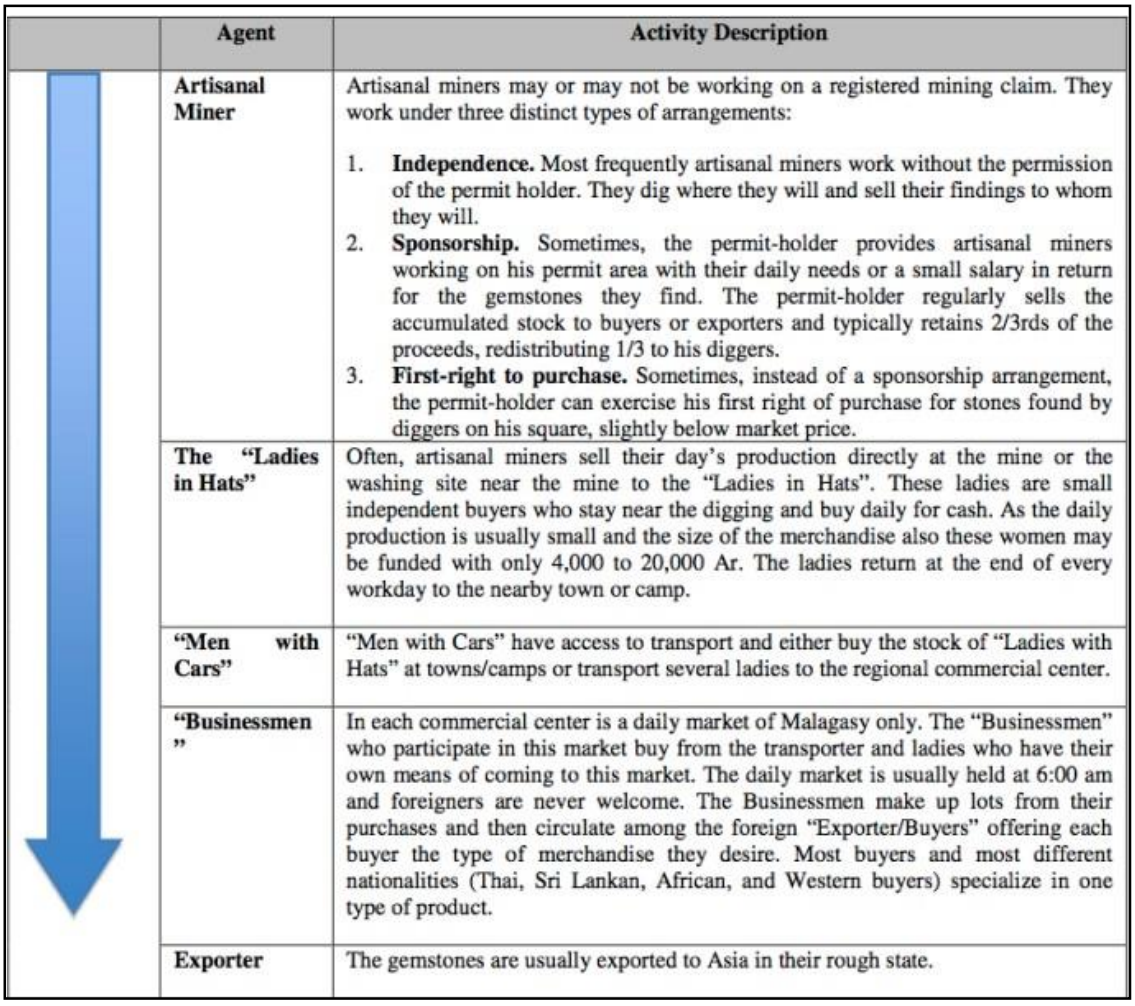
Formal Supply Chain

Just as in the informal supply chain, to sell stones with proper permits, miners still have to depend on global networks of foreign gem traders to transport the stones out of Madagascar to places such as South Asia, Southeast Asia, and Europe. As mentioned earlier, diggers either work individually or in small regionally-clustered groups, which are sometimes managed by members of the Malagasy elite or foreign patrons.

The stones are sold in their natural raw or cut forms to either Malagasy middlemen or directly to foreign exporters, who are typically Thai or Sri Lankan, among other nationalities. The middlemen can be both Malagasy and foreigners, and they act as the communication channel between the digger and exporter. More Malagasy persons are now becoming exporters. The exporters are considered the end members of the sapphire supply chain (Interviewee A, personal communication, November 6, 2018). Some dealers from Sri Lanka have set up counters in remote mining areas to induce miners to sell their product early, hoping to eliminate middlemen from the supply chain and establish direct trusting relationships with the miners (Cartier, 2009). Many gem dealerships line the main streets of rush towns, where buyers await either middlemen or the miners to come and present newly-found sapphires for inspection (Ross, 2014). Sellers and buyers can both lie to each other about the prices they are looking to receive and the prices they are willing to pay, respectively. Seasoned miners learn bargaining techniques from experience of selling stones to a variety of buyers, while buyers can always lie about the market for stones that are being offered. Similarly, miners or traders of the stones will highlight the positive qualities of the stones they present, while buyers will undermine the quality to buy at a lower price (Walsh, 2004).

Schmidt, R. (Photographer). (2008, September 15). View taken on September 15, 2008 of the mushrooming town of Ilakaka, which in October 1998 saw a major influx of illegal miners who came in search of fortune after the discovery of a large sapphire deposit.[digital image]. Retrieved from http://archive.boston.com/bigpicture/2008/10/the_sapphire_mines_of_madagasc.html

Cook and Healy (2012) provide a colorful supply chain narrative of the "ladies in hats" and "men in cars." Miners sell stones to ladies in hats who sit out in the sun waiting to trade the sapphires. The men in cars wait for the ladies to pass the stones off to them, after which the men pass the stones off to Malagasy "businessmen" who then sell stones to foreign buyers (Interviewee A, personal communication, November 6, 2018). This narrative highlights one of the roles women play in the sapphire supply chain. A description of the different types of supply chain activities are provided in Figure 12.



Agent	Activity Description
Artisanal Miner	Artisanal miners may or may not be working on a registered mining claim. They work under three distinct types of arrangements: 1. **Independence.** Most frequently artisanal miners work without the permission of the permit holder. They dig where they will and sell their findings to whom they will. 2. **Sponsorship.** Sometimes, the permit-holder provides artisanal miners working on his permit area with their daily needs or a small salary in return for the gemstones they find. The permit-holder regularly sells the accumulated stock to buyers or exporters and typically retains 2/3rds of the proceeds, redistributing 1/3 to his diggers. 3. **First-right to purchase.** Sometimes, instead of a sponsorship arrangement, the permit-holder can exercise his first right of purchase for stones found by diggers on his square, slightly below market price.
The "Ladies in Hats"	Often, artisanal miners sell their day's production directly at the mine or the washing site near the mine to the "Ladies in Hats". These ladies are small independent buyers who stay near the digging and buy daily for cash. As the daily production is usually small and the size of the merchandise also these women may be funded with only 4,000 to 20,000 Ar. The ladies return at the end of every workday to the nearby town or camp.
"Men with Cars"	"Men with Cars" have access to transport and either buy the stock of "Ladies with Hats" at towns/camps or transport several ladies to the regional commercial center.
"Businessmen"	In each commercial center is a daily market of Malagasy only. The "Businessmen" who participate in this market buy from the transporter and ladies who have their own means of coming to this market. The daily market is usually held at 6:00 am and foreigners are never welcome. The Businessmen make up lots from their purchases and then circulate among the foreign "Exporter/Buyers" offering each buyer the type of merchandise they desire. Most buyers and most different nationalities (Thai, Sri Lankan, African, and Western buyers) specialize in one type of product.
Exporter	The gemstones are usually exported to Asia in their rough state.

Figure 12. Annex Table 1. The Sapphire Value-Chain. Adapted from "Governance and Development Effectiveness Review
A Political Economy Analysis of Governance in Madagascar," by Public Sector Reform and Capacity Building Unit, World Bank. 2010. Report No. 54277-MG, 115. Copyright World Bank.

The World Bank (2010) has assessed that there has been a greater demand for a formal supply chain in recent years, with a recorded increase in applications for formal sapphire permits, as mentioned in earlier sections of the case study. Buyers are in fact showing increasingly more interest in exporting sapphires legally with permits and long-term visas, since they are obligated to follow certain procedures and to obtain papers in order to get the highest payment once they sell the stones overseas (Interviewee A, personal communication, November 6, 2018). Lawful permit holders are asked to formalize sapphire production from the point of extraction, in the following way:

- Obtain a "laissez-passers" to track the origin of gemstones and pay the mining royalty of

two percent of the selling price. (The permit holders are not usually those who mine. Similar to the Swiss Bank example, someone with money would require permission to dig, whether official or unofficial.)

- After financing the miners and the operation, they would receive the gems from miners and then sell those to foreign buyers/exporters in country or would personally take the stones out to the international market (Interviewee H, personal communication, November 8, 2018).
- While traveling, the gemstones would be accompanied by the laissez-passer from the sale to export.
- At this point, the Mining Ministry would issue an export authorization if the exporter was eligible to receive the required permit (World Bank, 2010).

The disconnect in the attempt to formalize the process is that permit holders often do not control production of the mining on their property, and artisanal miners do not know the permit holder. Permit holders can also sell the laissez-passers to foreign exporters, since the buyers need to have proof of origin to legitimately market their stones overseas. The de jure versus de facto differences shown in Figure 11 below were particularly common during the sapphire permit ban through 2004. Since formalization still occurs only at the time of export, this undermines the tracking of the laissez-passer system. Exporters, however, have better access to the passers now by holding sapphire permits. The World Bank (2010) also found that the laissez-passer taxation system is less effective, because there is no strong enforcement or incentives for Malagasy permit holders to pay taxes. Additionally, per the experience of one foreign buyer, after the 2009 ban, there were at least four different offices a sapphire exporting invoice would have to pass through to receive the necessary stamps. This process included the Ministry of Mines, the IGM, relevant banks, and then the permit had to be sent back to the Ministry of Mines. According to the buyer, the process could be sped up if small bribes were paid to the officials (Interviewee K, personal communication, November 19, 2018).

Hong Kong, as an emerging trading center for Malagasy sapphires, is becoming a significant part of the downstream supply chain and could again disincentivize exporters from following the legal steps when taking sapphires out of Madagascar. Buyers can now get invoices resembling those given out by the Malagasy government in Hong Kong, which acts as a free port for entry of

stones (Cook & Healey, 2012).

To make the sapphire export supply chain more transparent and formalized, the Malagasy government would need to work on reforming certain aspects of its permit issuance and would need to be more thorough in ensuring sapphires are being taken out of the country legally.

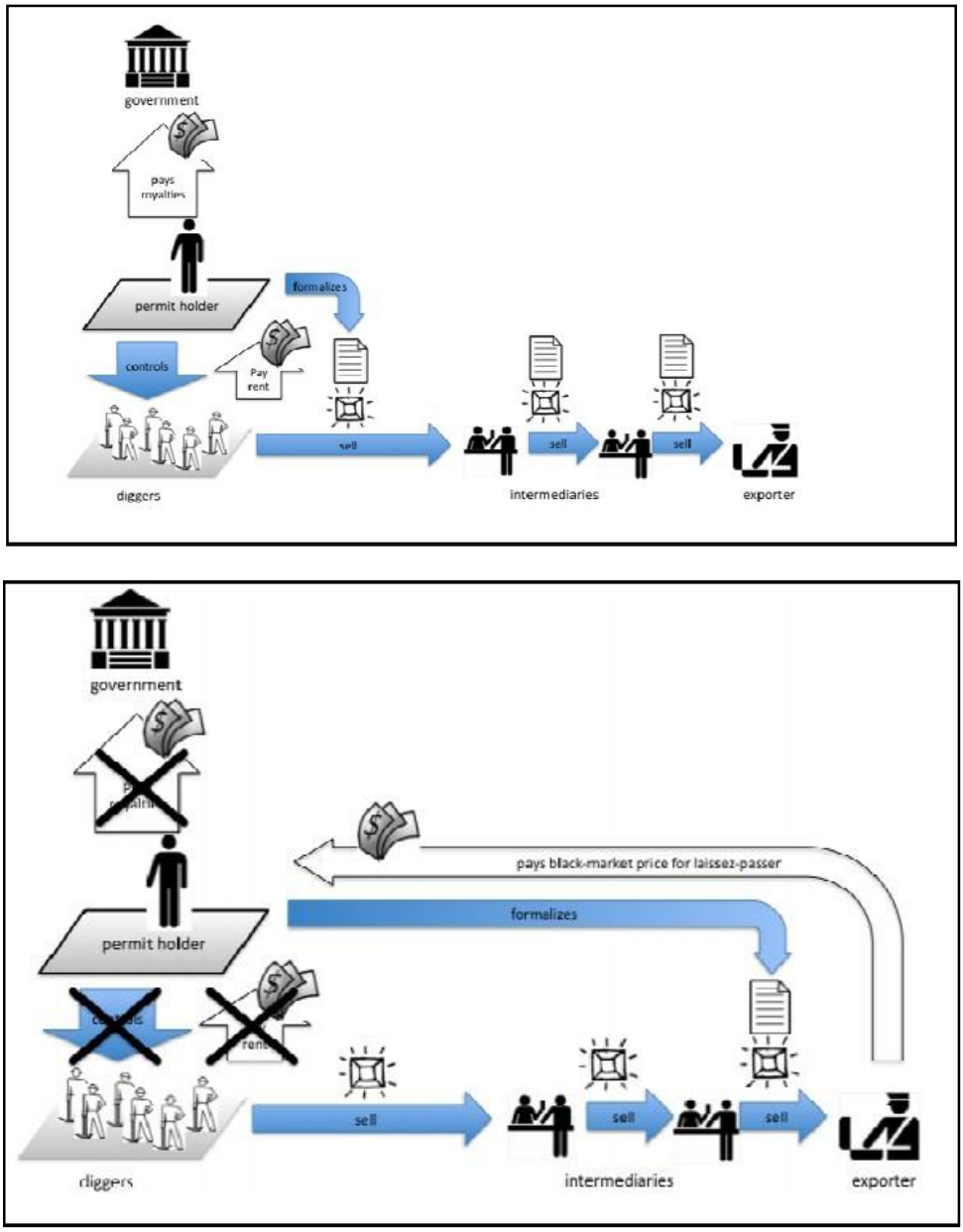


Figure 13. The Formalization of the Sapphire Supply-Chain: De Jure (formal) versus De Facto (informal). Adapted from "Governance and Development Effectiveness Review
A Political Economy Analysis of Governance in Madagascar," by Public Sector Reform and Capacity Building Unit, World Bank. 2010. Report No. 54277-MG, 111. Copyright World Bank.

Chapter 8: Research Gap and Problem Statement

Despite the wide use of precious gems and minerals in the jewelry industry and the importance of these commodities to trade relationships, national economies, and human rights issues, we still lack a comprehensive framework for assessing and comparing the relative risk they pose to human security in the states that produce them. Specifically, information on how the mining, manufacturing, buying, and selling of these precious minerals and gems affect human security on a comparative national scale must be aggregated, and acted upon. Too often, these commodities have a net negative impact on workers, communities, and the environment with the ignorance and or complicity of consumers, governments, and industry actors. As the two case studies detailed thus far have shown, the production of jewelry affects nations' quality of governance, economy, environment, health, and environment, and has serious implications for the protection of human rights. Trends in our analysis show that the economic impacts of jewelry production tend to be the most positive, and also serve as justification for tradeoffs made in terms of other more negative impacts. However, our analysis has also found cases of best practice, which should be highlighted and replicated. To properly confront these challenges, we aim to assist in the development of an objective index, which can help identify industry areas which need attention and improvement, and positive practices and impacts that can be exemplified and mimicked.

This research report furthers the work of two previous studies in providing two detailed literature reviews and case study analyses to contribute to the development and application of the Jewelry Development Impact Index. In combination with the two prior studies, this report seeks to be the basis on which data and information relative to the development and application of this index can be aggregated for assessment and comparison.

The first chapters of this report have been dedicated to case studies of sapphire value chains in Madagascar and platinum value chains in South Africa. The second half of the report will provide (1) a new proposed framework and methodology of the Jewelry Development Impact Index, (2) an application of this index methodology to Madagascar and South Africa, and (4) a six country comparative analysis in the methodological framework proposed by the previous report. Following this, we will provide recommendations on best practices in precious mineral

and gem value chains based on the index results, as well as on further development of the index itself.

Chapter 9: JDII and Application to Case Studies

9.1 Methodology, Framework, and Measurement

Choosing a Methodology for the Jewelry Development Impact Index

The methodology proposed here for the establishment of the Jewelry Development Impact Index (JDII) will depart significantly from the methodologies and conceptual frameworks proposed in the previous two reports. While the methodology proposed in the JDII Spring 2018 report, and the Fall 2017 report it built on, has informed this report, it has two main limitations:

- It is unclear how "country performance" is meant to relate to the jewelry development industries (i.e., are scores given a reflection of the country's general state of human security or are they meant to measure an impact?);
- The ordinal values assigned to indicator subcategories are not explicitly defined for consistent scoring across countries. It is unclear what objective factors translate to a score of "weak" versus "excellent."

The index methodology proposed in this report will aim to address these limitations. The first step is to establish a clear understanding of what the index will provide an assessment of, outlining which assumptions are made in this methodological proposal and discussing certain practical restrictions of evaluating the impact of these industries on human security. The second step will be to explore how the research of the case studies undertaken in this report, in combination with those from the two previous reports, informs this framing of purpose. In the third step, a methodological approach will be proposed, and in the fourth step it will be applied to the case studies in this report.

The Purpose of the Index

The purpose of the index will be to provide country assessments of the level of risk to human security posed by factors related to the presence of the precious mineral and gem industries in those countries. These assessments aim to provide accurate and reliable scores for each country to enable stakeholders to take informed actions to reduce the levels of risk to human security faced by countries, and increase the benefits of having a thriving industry.

This formulation of purpose is based on the assumption that human security in countries is affected, both positively and negatively, by the presence of precious mineral and gem industries. The purpose of this index will not be to establish quantitative proof that impact occurs. Establishing proof of quantitative impact, while a worthwhile research question which could potentially be studied through cross-sectional time series analysis on a country by country basis, would not be suitably addressed by a country index, which aims to provide guidance for stakeholders through an overview of the "state" of risk rather than the measurement of "change." In addition, such an impact evaluation study would require the establishing of a counterfactual for each country, which would be very difficult given the nature of the industries under study and the lack of available data on disaggregated, individual precious commodities. Therefore, the purpose of this index will not be answering the research question of whether impact indeed occurs, but, making the assumption that human security in each country is affected by the precious mineral and gem industries, to provide an assessment of risk. This risk assessment will be based on factors, which through the case studies, have been identified as having the potential to either increase or decrease the level of risk to human security posed by precious mineral and gem industries.

As seen in the case studies, precious mineral and gem industries can be very beneficial to countries, especially in terms of economy. By identifying factors, such as effective industry regulations, which help a country to reap the benefits of the industry while curbing potential threats to human security, such as environmental degradation, the methodology of this index aims to helps stakeholders find ways to increase potential benefits and mitigate potential risks. Research on the case studies of South Africa and Madagascar has provided us an understanding of what kind of data is available, and how it can be accessed, as well as what kind of data is not yet available. A broad based review of academic literature, news articles, business and civil society reports, and interviews with experts in the industry, business leaders, and government stakeholders has enabled us to triangulate information and produce insights which would not be possible by analyzing only the related quantitative datasets or indices which already exist. In the same way, the index methodology proposed will rely on expert knowledge to score countries' level of risk based on the factors identified in the six case studies.

Though this approach is qualitative and therefore involves degrees of subjectivity in scoring, it also makes use of the best source of information currently available, the expert stakeholders. In order to lessen any subjectivity, the score for each country will be based on verifying the degree of presence or absence of certain factors, and make use of existing indices where possible and relevant. By taking this approach, we aim to make the resulting country scores as transparent, consistent, and objective as possible.

Framework of the Proposed Methodology

This methodology will aim to assess the level of risk to human security precious mineral and gem industries pose to individual countries. On a country level, risk will be scored on a scale from 0 to 10, where 10 represents "Very High Risk" and 0 represents "Very Low Risk." Where there is very low risk, this means that the country is able to benefit from the precious mineral and gem industry without causing risk to human security. There will be five categories of risk assessment: governance, economy, human health, environment, and human rights. Each category is assessed according to the areas covered in its subcategories. Each subcategory will be assessed on the basis of critical questions. These questions can be answered in three ways:

(1) "yes" or "no," where "yes" signals the presence of a risk decreasing factor and "no" the absence of a risk decreasing factor; here "yes" = 0 points, and "no" = 1 point.

(2) "yes" or "no," where "yes" signals the presence of a risk increasing factor and "no" the absence of a risk increasing factor; here "yes" = 1 point, and "no" = 0 points.

(3) on a scale from 0 to 5, where each point level is individually defined for that question, with the aim of being mutually exclusive and jointly exhaustive as much as possible, and 0 represents no risk, and 5 represents very high risk; in the total category score, these questions may count for a total of 1 point.

The total for each subcategory, and then subsequently each category, will be calculated. To calculate the total country score, all categories will be weighted evenly to create a country score from 0 to 10. The critical questions are listed by category and subcategory in the Annex. Once, the country category scores are calculated, they will be plotted on a radar chart: the bigger the shape, the higher the risk to human security.

9.2 Case Study Analysis and Application of Index: South Africa and Madagascar

In this section, we will apply the proposed methodology to the case studies of South Africa and Madagascar. The minimum score for each category is 0, representing no risk, and the maximum score for each category is 10, representing very high risk. There are five categories of risk: governance, economy, environment, health, and human rights. Each category has a different number of subcategories, as listed below.

1. **Governance:** Accountability and state of governance, transparency, corruption prevention, industry regulation, and presence of criminal non-state actors and organization.
2. **Economy:** Industry employment, fiscal sustainability, beneficiation, smuggling and the informal economy, and criminal non-state actors and terrorist organization funding.
3. **Environment:** Environmental regulatory stringency and enforcement, existence and extent of pollution, impact on biodiversity, and post-production planning and remediation.
4. **Health:** Human health, food security, and water security.
5. **Human Rights:** Workers' rights, indigenous/ethnic group rights, women's rights, children's rights, and freedom from violence.

The score for each subcategory is the sum of the individual scores for each question in the subcategory divided by the number of questions in that subcategory. Every individual question score has a minimum value of 0, and a maximum value of 1, where 0 represents no risk, and 1 represents high risk. Every subcategory also has a minimum value of 0 and a maximum value of 1, calculated as the average of the scores for each individual question, so that each individual question score is weighted equally within its subcategory. As a written formula, this means that

Subcategory score = (sum of individual question scores) / (number of questions in subcategory)

The score for a category is the sum of subcategory scores multiplied by 10 divided by the number of subcategories in the category. Each subcategory is weighted equally in the category score. As a written formula, this means that

*Category score = (sum of subcategory scores) * (10 / number of subcategories)*

The minimum value for a category score is 0, representing no risk, and the maximum value is 10, representing very high risk. Based on a country's category, we can interpret the implications for human security in that country, and suggest, based on the scores for individual questions in the subcategories, how that country's risk to human security might be lowered.

To calculate a country's overall score for the risk to human security posed by the presence of a given precious gem or mineral industry in that country, we sum the country's category scores and divide them by 5, the total number of categories. The categories are weighted equally in the overall score. As a written formula, this means that

Overall score = (sum of category scores) / 5

The minimum possible value for the overall score is 0, representing no risk, and maximum possible value is 10, representing very high risk. When a country has a low overall score, we interpret this to mean that the country is well-prepared to benefit from its precious mineral or gem industry, and faces little risk to human security. When a country has a high overall score, we interpret this to mean that the country is not well-prepared to benefit from its precious mineral or gem industry, and could take measures both to improve its ability to benefit and to lessen the risk posed to human security.

9.2.1 Risk to Governance

South Africa

The risk to South Africa's governance posed by the platinum industry is rated low to moderate at 4.00 out of 10. In South Africa, fairly strong formal institutions are in place to monitor the industry and violators of the rule of law are usually held accountable. The country has a good track record of transparency in general, but corruption country wide and specific to the industry remains a problem. At the same time, highly organized criminal and terrorist organizations are reportedly involved in the illegally mining industry. This risk to governance in South Africa could be potentially be reduced by the following measures:

1. Participation in the EITI to improve effective and corruption free oversight of the industry;
2. Investing civil society actors who can act as third party monitors to the industry;

3. Enforcing public disclosure of government officials' finances;
4. Streamlining the process of obtaining mining permits by investing in staff training in anti-corruption and technology;
5. Continuing to invest in efforts to eradicate criminal syndicates and terrorist organizations.

Madagascar

The risk posed to Madagascar's governance by the sapphire industry is rated low to moderate at 4.02 out of 10. The government has the appropriate institutions in place to monitor the mining industry, including the Ministry of Mines and Petroleum. The Mining Code outlines the relevant regulations to ensure good governance in the mining industry. To further improve governance of the industry, the government also implemented the National Anti-Corruption Strategy in 2015 to improve transparency and reduce corruption.

Yet, while Madagascar has the institutions and laws in place to potentially ensure industry regulations and accountability, these regulations are not well enforced by the government. The Mining Code provides information on accountability measures, but the steps to enforce regulations and ensure accountability are not detailed in the Mining Code. Many miners are also part of the ASM industry and mine illegally, and industry regulations are not enforced in the informal sapphire mining industry. In addition to the lack of accountability in the mining industry, transparency remains an issue in Madagascar and information regarding the mining industry is limited and not well distributed to the public.

Overall, Madagascar has some appropriate institutions and laws in place that are serve the purpose of holding the industry accountable to industry regulations. However, Madagascar should take measures to further reduce the risk that the sapphire industry has on its governance. The risk can be reduced by the following measures:

1. Improve the accessibility of acquiring a mining license, specifically for miners in the ASM industry. Licensing is a foundational step for enforcing industry regulations.
2. Improve public access to government information and government officials' finances.
3. Implement a regular annual assessment of the National Anti-Corruption Strategy.

9.2.2 Risk to Economy

South Africa

South Africa's score for the risk posed to its economy by the platinum industry is 4.66, which represents a low to moderate risk posed to the country's economy by the platinum industry. As demonstrated in the detailed case study, South Africa's platinum industry brings a lot of benefit to the country's economy by providing high paying employment to a significant number of citizens in the total labor force, and providing a source of income to the government through taxes.

On the other hand, the fiscal sustainability of the platinum industry in South Africa is not strong. Foreign direct investment in South Africa's platinum industry and global demand for platinum for jewelry are declining. This can be partially explained by efforts to use recycled platinum for jewelry, and a relative oversupply of platinum above ground. South Africa also faces moderate risk from the lack of beneficiation it has been able to foster: the platinum industry in South Africa almost exclusively comprises mining and refining, and there has been little investment in training the labor force in higher value added activities, such as platinum jewelry manufacturing. South Africa has invested in a beneficiation in general, but this has mostly been focused on the development of platinum use in autocatalytic converter manufacturing, platinum use in fuel cell manufacturing, and craft jewelry manufacturing for gold and diamonds.

The highest risk to South Africa's economy is from the highly organized informal platinum mining industry. South Africa loses opportunities for taxation from the informal economy, and people working informally are typically subject to risky work environments and unfair payment of wages. On top of this, there have been reports that some terrorist organizations, international criminal syndicates, and national criminal syndicates have a presence in this informal industry. While it is impossible to know exactly how much of the informal mining is specifically for platinum intended for jewelry, the presence of these criminal non-state actors poses a higher risk to South Africa's economy.

Overall, South Africa's low to moderate risk ensures that is does reap a significant economic benefit from hosting the platinum jewelry industry. This risk could be further reduced by:

1. More efforts on the part of the government and the business sector to foster platinum jewelry beneficiation by investing in labor force training and skill development for higher value adding activities;
2. Continued efforts on the part of the government to eliminate, disrupt, or formalize the informal mining industry;
3. Collaboration between the government and the business sector to create a track and trace system for raw, legally mined platinum intended for export;
4. Raising consumer awareness about platinum sourcing to create a demand for platinum jewelry which has been legally mined and exported by companies who can be held accountable.

By taking these steps to reduce the risk to economy, South Africa can increase its preparedness to benefit from the platinum jewelry industry.

Madagascar

The risk posed to Madagascar's economy by the sapphire mining industry is moderate, rated at 4.92 out of 10. The industry is a major provider of economic opportunity on the island, employing an estimated 1.5 million Malagasy, directly and indirectly. In a country that is still largely agrarian and experiences high levels of poverty, sapphire mining offers an accessible way for thousands to increase their earning potential and even raise themselves out of poverty.

These benefits in employment are tempered, however, by the failures in the categories of fiscal sustainability and beneficiation. While sapphires reserves are estimated to last for years to come, Malagasy government has yet to fully capitalize on the industry, despite having had two decades of consistent sapphire production since the gem was first discovered on the island. As most of the activity in the sapphire mining industry is informal, the government is unable to effectively enforce regulations and collect taxes, allowing the industry to police itself and the private sector, and namely international traders, to reap most of the profit. The revenue collected from the portion of the industry that is taxed has yet to be allocated in a way that benefits the greater community.

This mismanagement and lack of public investment in the industry's development has not inspired foreign direct investment, which has been decreasing since the 2009 coup. Such

investment is sorely needed in the area of beneficiation, which has a very minimal presence in Madagascar due to the lack of skilled labor and equipment. Without the ability to add value to the sapphires they mine, Malagasy are limited to exporting the stones in their raw form, when they are least valuable. By exporting the stones so early in the value-chain, there is no way of ensuring the stones are not fraudulently being sold as sapphires from a more valuable origin, such as Sri Lanka. This results in the underrepresentation of Malagasy sapphires on the global market and a lost opportunity to build the country's reputation, which has the potential to dramatically increase the value of the gems.

One positive indicator is the absence of criminal non-state actor and terrorist funding in the Malagasy sapphire industry. While the Madagascar Terrorism Index has increased over recent years, our report found no evidence to suggest that such illicit financial threats are part of the risk posed by the industry.

Steps that can be taken to reduce risk to the economy include:

1. Resume the issuing of permits, streamlining and incentivizing permit applications, so as to further formalize the industry and increase the revenue collected through royalties.
2. Invest industry revenues into the development of the beneficiation sector.

9.2.3 Risk to Environment

South Africa

South Africa's score for the risk posed to its environment by the presence of the platinum industry is 6.26, representing a moderate level of risk to the country's environment by the platinum industry. South Africa's government has regulations towards air, water, remediation of mining lands, and protected areas that were put in place to protect the environment from damage caused by platinum mines. Additionally, the government requires mining companies to have a permit before they are allowed to begin mining.

However, the government has not enforced these established regulations to ensure less significant environmental damage, which can later lead to health issues. South Africa's government does not have the manpower to regulate the mining industry, which is crucial in addressing the damage already done by the mining companies.

The highest risk to South Africa's environment is the fact that there is a lack of enforcing the regulations in place. Consequently, the platinum mining occurs in highly biodiverse areas which have high pollution levels in these areas that are quite significant to the damage of the environment.

Overall, South Africa's moderate risk ensures that there are environmental protections in place to remediate environmental damage. This risk could be further reduced by:

1. More efforts on the part of the government to enforce the environmental laws that are in place to help remediate the damage done by air, water, and soil pollution, as well as protecting more of the biodiverse areas.
2. By the government creating and enforcing soil pollution regulations.

By taking these steps to reduce the risk to the environment, South Africa can increase its sustainability of the environment and the continuance of platinum mining within the region.

Madagascar

Madagascar's score for the risk posed to the country's environment by the sapphire industry is 6.15, which indicates that sapphire mining poses a moderate-high risk to the environment. The Mining Code establishes regulations that address environmental concerns, specifically regarding protected areas, distribution of mining licenses, and the remediation of damaged land. Madagascar also implemented its National Biodiversity Strategies and Action Plans in 2015 in an effort to establish regulations that protect the country's biodiversity from mining processes. In addition to the regulations and plans, Madagascar's Ministry of Mines worked alongside the Ministry of Environment, Ecology, and Forests to establish an inter-ministerial order to further address environmental protections.

While the government has established regulations and bodies of government to oversee mining processes and its impact on the environment, there is limited implementation of the regulations. Most of Madagascar sapphire is mined by the ASM industry, which is difficult to predict the locations due to the spontaneity of the mining rushes. Experts in the field have stated that it is difficult for the government to further enforce regulations due to the country's dense forests. However, government presence in the mining areas are limited, and there is little, if none, oversight of the mining sights, including protected areas.

Remediation efforts are also not enforced by the Malagasy government. During the mining rushes, miners may strip the land of its biodiversity, such as through deforestation. According to Article 102 of the Mining Code, miners and companies are required to rehabilitate the land after mining operations. However, the land degradation caused by the miners is not remediated after miners leave the area and there is no oversight from the government to ensure that the land is rehabilitated after mining operations end.

Since the Mining Code applies to all that hold mining licenses and many ASM miners mine without a license, miners may also have limited information on the environmental protections that miners must consider. The government does not ensure that miners have the appropriate license, which increases the mining's risk on the environment.

Madagascar has the regulations and institutions in place to protect the country's biodiversity. However, the risk to the environment can be reduced by the following:

1. Increase government presence during mining rushes, particularly in protected areas. While the mining rushes may be difficult to predict, the government should locate the area of the rush when it occurs and concentrate its presence there, specifically where the land is protected under the government.
2. Continue government investigations of recently protected areas for which mining licenses were previously distributed. These efforts were stalled by political unrest over the last decade. However, continued investigation can provide a basis for implementing further regulations on these protected lands.
3. Improve the process of acquiring a mining license and establish incentives for miners to acquire licenses and adhere to environmental protection regulations.
4. Increase the enforcement of regulations to limit or remediate air, water and soil pollution.
5. Increase regulations for mining in highly biodiverse areas.
6. Ensure and enforce remediation of mining sites and set aside money to be properly used for remediation.

9.2.4 Risk to Human Health

South Africa

South Africa's score for the risk posed to its human health by the presence of the platinum industry is 5.67, representing a moderate level of risk to the country's human health by the platinum industry. South Africa's government enforces the Human and Safety Act, which holds the platinum mining companies accountable with their regulations pertaining to their mining workers' health and safety. Additionally, the mining companies in conjunction with the government work on health campaigns and contribute to healthcare to treat diseases.

By contrast, the health issues caused by the platinum mining industry are quite significant, not only for the miners but also for the communities surrounding the mining industry. Platinum mining includes high-risk work for the miners, even when the mining companies addressing the health and safety issues associated with mining, there are still fatalities that occur within the platinum mining industry due to incidents or diseases.

The highest risk to South Africa's human health are both from water and food security, partly due to the living conditions near the mines, but also because of the environmental damage done by the platinum mining industry. South Africa's platinum mining companies have taken the agricultural labor force because the pay is better, which causes a risk to the future of the agricultural sector.

Overall, South Africa's moderate risk ensures that human health benefits from the adherence to the Health and Safety Act by the platinum mining companies. This risk could be further reduced by:

1. More efforts on the part of the government to enforce the restriction of potable water use, through WULs, to platinum mining companies.
2. More efforts on the part of the government and mining companies to include filtration of the potable water for communities surrounding the mines, as a part of the corporate social responsibility. Not only will this be beneficial for their miners, but also for the community at large.

3. More efforts on the part of the government to enforce the remediation of previously mined lands, so as to assist the development of the agricultural sector, and pursue job creation for the communities surrounding the former mining site.

By taking these steps to reduce the risk to human health, South Africa can increase its preparedness to benefit the platinum miners, as well as the communities surrounding the platinum mines.

Madagascar

The risk to human health in Madagascar posed by the sapphire mining industry is scored as moderately high at 8.58 out of 10. The mining involves very little mechanization and is highly labor intensive, often placing miners at risk of considerable physical harm. While the country's Mining Code does stipulate that claim holders are responsible for the health and safety of miners, this is undermined by the lack of enforcement and the fact that few miners hold official claims in the first place. The predominantly informal nature of the industry also means that artisanal miners typically work on sites that are unsecured and without proper safety equipment.

Food and water security are a general health concern for most of the Malagasy population. Many of those mining for sapphire in remote regions face additional challenges in accessing food, water, and sanitation. While the artisanal and small-scale mining of sapphires does not require enough water to pose a risk of depleting the water supply, it may contribute to localized contamination related to sediment and human waste. Sapphire mining in Madagascar does not generally take place on land dedicated to farming, and thus does not pose a geographic risk to food security. Agricultural workers are being attracted to the sapphire mining industry, which would suggest a potential risk to food security, although this is seemingly refuted by evidence that cereal crop productivity has been increasing.

Steps to help mitigate the threat to human health posed by sapphire mining include:

1. Provide free or low-cost safety gear as well as information about safety to miners;
2. Open health clinics in rural communities and mining sites;
3. Invest in water and sanitation systems in rural communities and mining sites.

9.2.5 Risk to Human Rights

South Africa

South Africa's risk to human rights posed by the platinum industry is rated as low at 2.29 out of 10. Because the mining industry is highly formalized, operated by large international companies, and fairly strictly regulated, workers are generally well treated and comparatively well paid. It is notable however that workers' rights improved in the last several years following violent protests. HDSA and women's employment in the industry in enshrined in the Mining Charter, and the majority of the best paid jobs (machine operators) in the mining industry are held by women. Children are absolutely excluded from the formal mining sector. Finally, though violent protests have occurred in the past, mining companies and governments have taken measures to deliberately forestall the possibility of future violence resulting from protest. South Africa could further reduce its risk to human rights by:

1. Investing in multi-stakeholder discussions concerning the actualization of the targets set out in the new Mining Charter in 2018;
2. Improving its process of negotiating compensation and resettlement packages for communities;
3. Eliminating forced displacement of communities.

Madagascar

Madagascar's score for the risk posed to its human rights by the sapphire industry is 5.00, which represents a moderate level of risk. As demonstrated in the case study, it is difficult to determine the extent to which women and children are exposed to forced labor and sexual exploitation, because there is an absence of corroborated statistics for sapphires specifically. However, as with most informal means of income-earning, these activities present a potentially high risk for trafficking and sexual exploitation.

Increased risk across all five subsections is derived from the government's unwillingness to enforce legal regulations and labor codes on the industry. Although the government administers permits, the stagnated process disincentivizes miners and buyers from following the procedures. Bureaucracy and inefficiency make it more inconvenient for artisanal miners to follow the rules. For the increased insecurity in mining communities, the government has done very little to assure the situational safety of miners and residents.

The highest risk to Madagascar's human rights, specifically the risk posed to workers,' comes from the predominantly informal nature of the industry. Miners' inability to benefit under Madagascar's legal working code deters them from being protected by health and sanitation standards. They also lack the ability to voice concerns through unions. There is a disincentive to formalize their earnings for fear of losing necessary income to relatively high taxes and royalty fees. Overall, despite Madagascar's moderate risk to human rights, most persons in rural areas and even in cities will continue to engage in mining because few better economic alternatives for increasing one's standard of living exist.

This risk to human rights could be further reduced by the following suggestions, which were inspired by measures outlined by the Business for Social Responsibility (n.d.).

1. Formalize the industry more and address human rights issues through policies and training related to health, safety, labor rights, discrimination, and sexual exploitation;
2. Improve enforcement of legally coded protections in this industry for the most vulnerable groups in Madagascar - children, women, indigenous/particular ethnic groups;
3. Strengthen the security apparatus in mining areas but ensure local participation and engagement in the process, to understand the core of the insecurity;
4. Enforce that buyers/intermediaries conduct training with employees (miners) on good labor practices and clear expectations of contracts.

By taking these steps to reduce the risk to human rights, Madagascar can ensure the safety, rights, and well-being of the most vulnerable members of the sapphire mining industry.

9.2.6 Overall Country Scores

Table 2 shows the category, subcategory, and total country scores for South Africa and Madagascar. For a full explanation of how we determined each score, please see Annex A. For an overview of risk increasing and risk reducing factors per South Africa's and Madagascar's subcategory and the corresponding recommendations, please see Annexes B and C.

Table 2. Risk to Human Security in South Africa and Madagascar

Category	Subcategory	South Africa	Madagascar
Risk to Governance	Accountability/ State of Governance	0.08	0.32

	Transparency	0.40	0.46
	Corruption Prevention	0.32	0.60
	Industry Regulation	0.20	0.63
	Presence of Non-state actors/Criminal orgs	1.00	0.00
Category Score		4.00	4.02
Category	Subcategory	South Africa	Madagascar
	Industry Employment	0.04	0.40
	Fiscal Sustainability	0.44	0.56
	Beneficiation	0.45	0.70
	Smuggling and the Informal Economy	0.55	0.50
Risk to Economy	Non-state actor and terrorist funding	0.85	0.30
Category Score		4.66	4.92
Category	Subcategory	South Africa	Madagascar
	Environmental regulatory stringency and enforcement	0.57	0.63
	Existence and extent of pollution	0.67	0.50
	Impact on Biodiversity	0.80	0.80
Risk to Environment	Post-production planning and remediation	0.47	0.53
Category Score		6.26	6.15
Category	Subcategory	South Africa	Madagascar
	Human Health and Safety Risks	0.20	0.83
	Food Security	0.75	0.75
Risk to Health	Water Security	0.75	1.00
Category Score		5.67	8.58
Category	Subcategory	South Africa	Madagascar
	Workers' Rights	0.30	1.00
	Women's Rights	0.16	0.52
	Children's Rights	0.07	0.40
	Indigenous/Ethnic Groups' Rights	0.30	0.10
Risk to Human Rights	Freedom from Violence	0.32	0.48
Category Score		2.29	5.00
		South Africa	Madagascar
Overall JDII Scores		4.58	5.74

In Figure 14 and Figure 15, the category scores for South Africa and Madagascar have been plotted on a radar chart, respectively. The size of the shape represents the level of risk to human security posed by the given industry present in the country: the larger the shape, the higher the risk to human security. Each axis of the radar charts represents one category of human security rated on a scale from 0, representing no risk, to 10, representing very high risk.

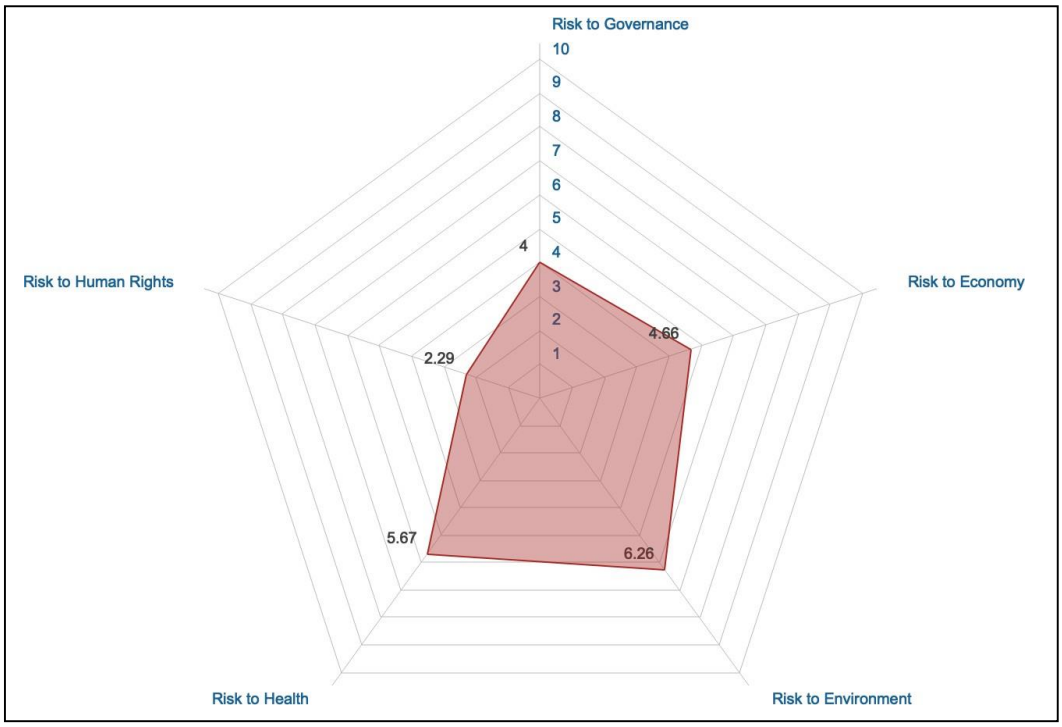


Figure 14. Risk to Human Security Posed by the Platinum Industry in South Africa

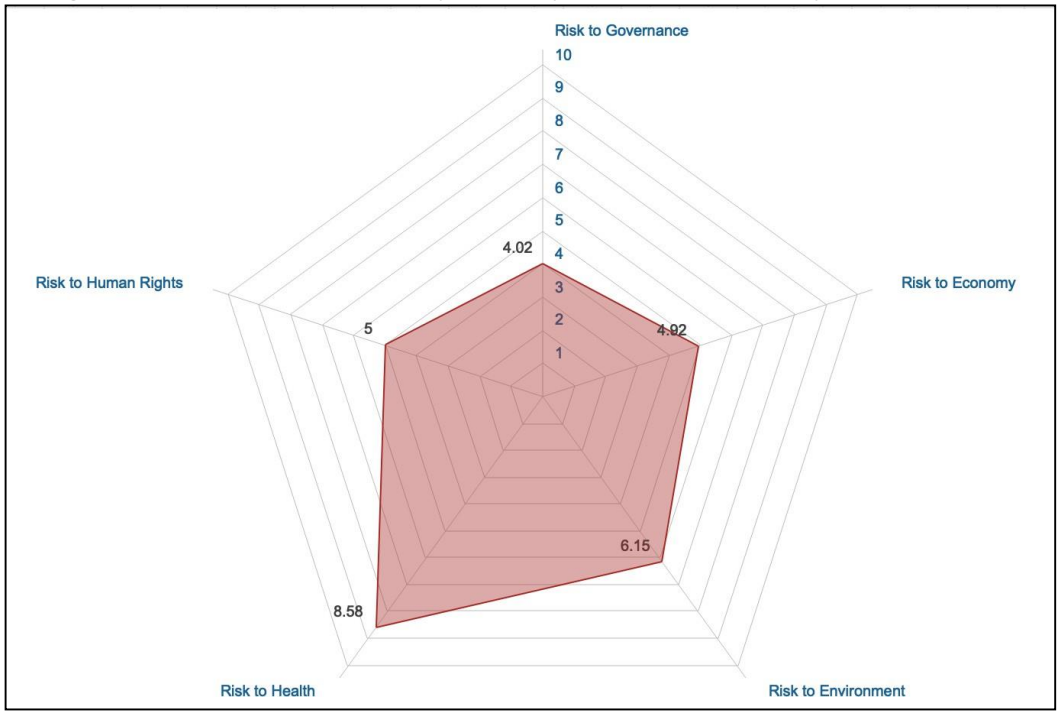


Figure 15. Risk to Human Security Posed by the Sapphire Industry in Madagascar

Figure 16 shows a comparison of the risk to human security by category in South Africa and Madagascar.

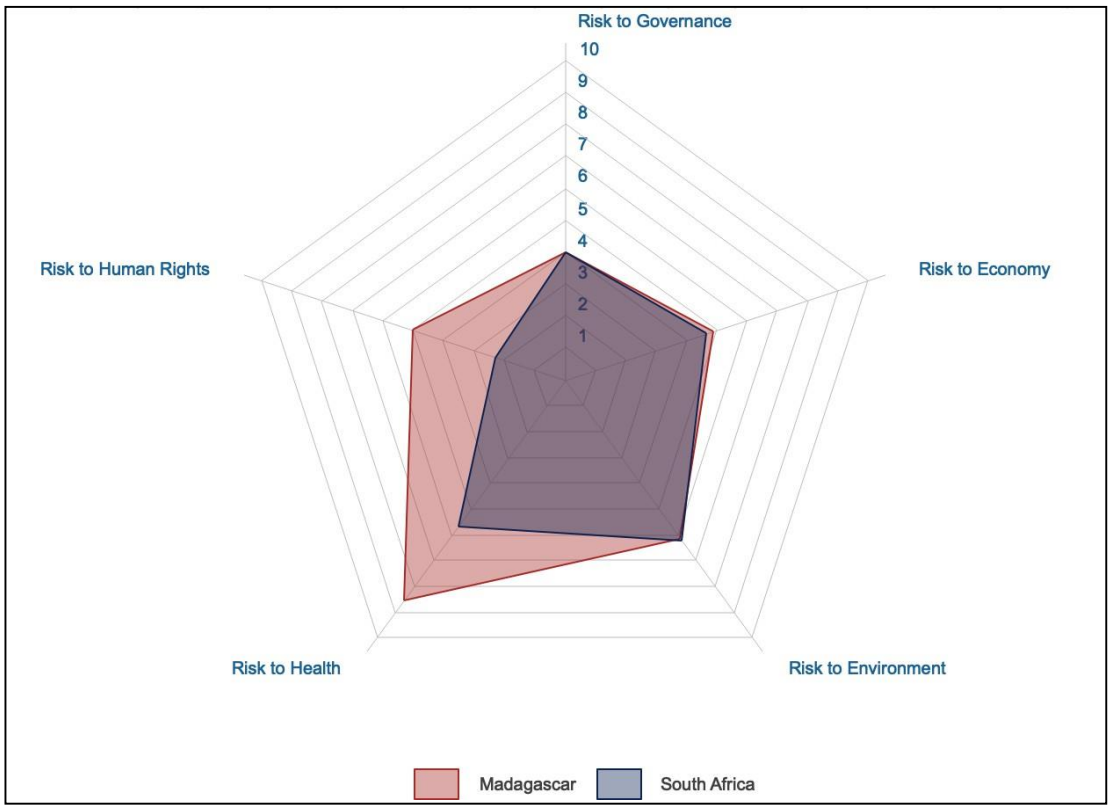


Figure 16. Comparison of Human Security Risk in South Africa and Madagascar

9.3 Index Comparison: Botswana, Peru, Afghanistan, Myanmar, South Africa, and Madagascar (Spring 2018 Comparison Method)

In this section, we apply the methodological approach proposed in the previous reports to analyze the sapphire Madagascar and platinum South Africa case studies alongside the case studies of Botswana, Peru, Afghanistan, and Myanmar. In this approach, we score each subcategory on a scale from 1 to 5 with the following descriptors: 1- very weak; 2- weak; 3- moderate; 4- strong; 5- excellent. This six country comparison does not measure the risk to human security posed by a precious mineral or gem industry, but is an attempt to assess a country's performance level in regards to the given categories and subcategories. Category scores are calculated as the average score of the relevant subcategories, and the overall country scores are calculated as the average of the category scores. Because country scores are dependent

on the judgement of the scorer, we also provide a brief rationale for each category score. Table 2 summarizes the scores for each of the six countries.

However, it is important to note that we do not recommend the utilization of this methodological approach for further development of the index for the reasons outlined in Chapter 9.1. While this approach can provide a somewhat useful comparative framework for these six detailed case studies, the subjective and ambiguous nature of the scoring is prohibitive.

Madagascar

Governance Overall: Weak (2)

While the Malagasy government has the institutions and offices established to regulate the mining industry, the institutions are not effective in holding miners and companies accountable for acquiring the required documents to mine for sapphire. Governance over the ASM industry is specifically highly unregulated. Requirements for government information to be accessible to the public do not exist and the procedure to acquiring government information is not monitored. While suppression of the press decreased since 2014, the press still has limited freedom in Madagascar and there has been reports of violence against journalists. To improve transparency and decrease corruption, Madagascar implemented a National Anti-Corruption Strategy in 2015 that is effective until 2025. While the strategy has been implemented for three years, corruption within the government persists. There has been limited efforts to investigate cases of government corruption by BIANCO, which oversees the National Anti-Corruption Strategy. Furthermore "rent-seeking" persists in the country's mining sector, in which payments for licenses are demanded by high-level officials and officials are involved in the politics of the mining sector. Madagascar established the Mining Code in an effort to enforce regulations and requirements over miners and mining companies. While the government has formal regulations, the regulations are not heavily enforced by the government. Many miners in the ASM industry do not obtain the required licenses due to the difficulties and costs in the mining license process. Economy Overall: Moderate (3)

Madagascar's economic performance in relation to the sapphire jewelry industry is moderate, with a score of 3 out of 5. The sapphire mining industry employs a significant portion of the Malagasy population, directly and indirectly, and offers individuals a considerable opportunity for economic gain. However, the government's inability or perhaps even unwillingness to

formally collect taxes and allocate revenue from the industry means that very little is produced in terms of public goods or services. The majority of Malagasy sapphires are smuggled out of the country, due in part to barriers to export, for beneficiation in southeast Asia. Because there is such little capacity for beneficiation on the island, Malagasy typically have no choice by to sell the stones in their raw form, when they are at the lowest in value. The challenges hinder the potential of the sapphire industry's contribution to the economic prosperity of Madagascar as a whole.

Environmental Impact Overall: Weak-Moderate (2.5)

Sapphire mining in Madagascar has some impact on the environment due to process of acquiring sapphire. Deforestation is the main issue regarding environmental impacts caused by the sapphire mining industry. Sapphire mining rushes also often occur in rural areas that are biodiversity-rich, leaving the areas vulnerable to environmental degradation, including deforestation. There is the Mining Code established in Madagascar as well as inter-ministerial orders that discuss the regulations over environmental protections. The National Biodiversity Strategies and Action Plans was also implemented in 2015. While there is a general framework for environmental protections, the regulations are not enforced specifically in regards to protected areas and obtaining a mining license.

Health: Weak (2)

Madagascar's health performance in relation to the sapphire jewelry industry is weak, with a score of 2 out of 5. While Madagascar states in its Mining Code that the holder of a mining claim is responsible for the health and safety of those mining on said claim, there is no enforcement on the fraction of mining claims which are actually legally registered. In addition to lacking protections, there is little medical care available to miners should they get hurt. Furthermore, artisanal mining sites can often be remote, meaning miners are often reliant upon whatever food or water they were able to bring, and often lack basic sanitation facilities. Established mining towns such as Ilakaka are the rare exception to this rule, but even then the health and sanitation services are through private providers and not the government.

Human Rights Overall: Moderate (3)

Sapphire mining has a moderate impact on Madagascar's human rights. It is difficult to assess the extent of human rights violations present in the industry. The most clear degradation of human rights are workers' rights, which also encompasses women and children. Although the government has laws meant to protect workers across all industries, they are not typically enforced in sapphire mining. Most do not have the ability to unionize or organize formally. Although the industry seems to improve women's livelihoods and their ability to become independent, possible sexual exploitation and lack of land rights bars women from fully profiting/engaging in the industry. Regarding children's rights, since the education system is underdeveloped, children join their families to contribute to their economic situation. Although we found very few accounts of forced labor, informal industries always have the chance of presenting risks of sexual and other type of exploitation for children. Sapphire rushes undoubtedly bring some insecurity to surrounding populations through theft and confrontations varying in degrees of violence. We have not found many reports of human trafficking related to this industry.

South Africa

Governance Overall: Moderate (3.0)

South Africa's country performance in terms of governance is moderate at 3.0 out of 5.0. South Africa has fairly robust framework for industry regulation, and this regulation is increasingly strictly enforced. Transparency in the country in the country is also fairly good, and much information relative to the industry is available to the public. Yet, corruption continues to plague the country, and the risk of criminal or terrorist organizations presence in the illegal platinum industry is high.

Economy Overall: Moderate (3.4)

South Africa's economic performance in relation to the platinum jewelry industry is moderate, with a score of 3.4 out of 5. Industry employment in the platinum mining industry provides a good source of employment and income for many citizens. Fiscal sustainability is rated more moderately, since the global demand for platinum for jewelry is slowing relative to the supply aboveground and recycling is becoming an increasingly important source for platinum jewelry

manufacturing. Beneficiation is rated as weak, as almost no attempts at creating higher value adding activities have been undertaken in South Africa, though it has been a topic of public discussion. Smuggling and the informal platinum industry is relatively large and highly organized, resulting in loss of government income via taxation. In addition, criminal non-state actors and terrorist organizations are reported to be involved in the illegal mining and export of platinum, and the precious metal itself is difficult trace in its raw form. The combination of these factors gives South Africa moderate rating for economic performance.

Environment: Weak-Moderate (2.5)

South Africa's environmental performance in relation to the platinum jewelry industry is weak-moderate, with a score of 2.5 out of 5. The South African government has developed many regulations to help eliminate environmental damage through regulations towards air and water pollution, remediation of mining lands, and ensuring the conservation of protected areas. Additionally, the government requires the mining companies to obtain a mining permit through certain procedures before obtaining approval. However, since the government lacks enforcement of these regulations due to the lack of manpower that they hold, there has been a significantly higher amount of environmental damage by platinum mining companies. Furthermore, platinum mining occurs in highly biodiverse areas, along with high levels of air, water, and soil pollution in the area creates a significant amount of damage to the environment. The combination of these factors gives South Africa a weak-moderate rating for environmental performance.

Health: Moderate (3)

South Africa's health performance in relation to the platinum jewelry industry is weak-moderate, with a score of 3 out of 5. The South African government enforces the Human and Safety Act, which holds platinum mining companies accountable with regulations pertaining to miners' health and safety. In addition, the government and mining companies in a joint effort have established health initiatives and healthcare to provide to miners. However, the platinum mining industry is considered high-risk work, even with the government and platinum mining companies addressing the health and safety issues, there continue to be fatalities that occur due to incidents or disease. Furthermore, the risk to water and food security within platinum mining communities, due to living conditions and environmental damage from the nearby mines has created a high

risk for human health in the areas in and around the platinum mines. The combination of these factors gives South Africa a moderate rating for human health performance.

Human Rights: (4.0)

South Africa's human rights performance in relation to the platinum industry is strong at 4.0 out of 5.0. Worker's receive one of the highest wages in the country, and the Mining Charter aims to promote HDSA and women's equality, access, and benefit from the platinum industry. The highly formalized and international industry has a general culture of protection of human rights, and child labor in the legal industry is unheard of. On the other hand, historical violence in response to worker protests lowers South Africa's score. While the situation has improved, a longer period of observation is necessary to determine if lasting change has taken place in terms of workers' right to unionize and protest free of violence.

Table 3. Six Country Comparison

Country Performance							
Very Weak- 1, Weak- 2, Moderate- 3, Strong-4, Excellent-5							
Category	Subcategory	Myanmar	Afghanistan	Botswana	Peru	South Africa	Madagascar
Governance	Accountability/ State of Governance	1	1	4	3	4	1.5
	Transparency	2	1	3	2	3	2
	Corruption Prevention	2	1	3.5	2	2	2
	Industry Regulation	2	NR	5	4	4	2
	Presence of Non-state actors/Criminal Organizations	3	1	5	4	2	3
Overall Category Score		2	1	4	3	3	2.1
Category	Subcategory	Myanmar	Afghanistan	Botswana	Peru	South Africa	Madagascar

Economic Impact	Industry Employment	3	2	3	2.5	5	5
	Fiscal Sustainability	3	1	3	2	3	3
	Beneficiation	1	NR	3	2	2	1
	Smuggling and the Informal Economy	1	1	3	2.5	3	1
	Non-state actor and terrorist funding	4	1	NR	2	2	5
Overall Category Score		3	1	3	2	3	3
Category	Subcategory	Myanmar	Afghanistan	Botswana	Peru	South Africa	Madagascar
Environmental Impact	Environmental Sustainability	2	3	5	1	2	2.5
	Legal Environmental Protections	3	2	5	2	3	3
Overall Category Score		2.5	2.5	5	1.5	2.5	2.5
Category	Subcategory	Myanmar	Afghanistan	Botswana	Peru	South Africa	Madagascar
Human Health Impact	Human Health and Safety Risks	2	1	NR	1	3	2
	Food Security	2	1	2	1	3	2
	Water Security	2	NR	NR	1	3	2
Overall Category Score		2	1	2	1	3	2
Category	Subcategory	Myanmar	Afghanistan	Botswana	Peru	South Africa	Madagascar
Human	Workers' Rights	2.5	2	2.5	1.5	4	2.5

Rights Impact	Women's Rights	3.5	1	NR	NR	4	4
	Children's Rights	2.5	1.5	3	1	5	3
	Indigenous/Ethnic Groups' Rights	3	NR	1	1	4	3.5
	Freedom from Violence	NR	2	NR	1.5	3	2
Overall Category Score		3	1.5	1.6	1	4	3
Overall Country Scores		Myanmar	Afghanistan	Botswana	Peru	South Africa	Madagascar
		2.5	1.4	3	2	3.1	2.5

Chapter 10: Best Practices in the Jewelry Industry

10.1 Mechanisms of enforcing human security standards

For any industry, there are general mechanisms by which standards of production can be set and enforce. These mechanisms can be applied in combination with one another, or individually and generally aim to reduce risk to human security, such as human rights, labor rights, or environmental protection. There are six broad categories of enforcement mechanisms. (Beck et al., 2017)

- Social Clauses in Trade Agreements: In this case, trade agreements between countries include clauses that aim to protect human or labor rights, and if this clause is violated the offending country could, e.g., lose the trade from the partner country altogether, be required to pay a fine, etc. The social and labor clauses are usually based on conventions set out by, e.g., the ILO's Decent Work Agenda.
- Public Procurement: National governments contract companies which have the highest social and labor standards for public procurement projects, instead of contracting the cheapest companies.
- Global Framework Agreements: Global union federations (GUFs) make international agreements with transnational companies. Transnational companies are powerful global actors for enforcing social and labor standards, while trade unions can provide monitoring of company behavior.
- Codes of Conduct- Consumer Driven: Civil society actors, such as NGOs, set standards for an industry, and then apply different approaches for enforcement. These can include labelling, e.g., fair-trade labels for coffee, or consumer awareness campaigns.
- Codes of Conduct- Business Driven: Businesses voluntarily adopt codes of conduct to ensure certain social, labor, environmental, and human rights standards. Often, these codes of conduct are extended to first tier suppliers, but do not extend to second tier suppliers. Monitoring and evaluation can be weak in this enforcement mechanism, since the businesses usually self-monitor.

- UN Guiding Principles on Business and Human Rights: In 2011, the UN Human Rights Council unanimously adopted these guiding principles. These principles are international soft law, and do not have sanctioning power, but provide legitimacy to stakeholders pushing industries towards higher standards.

All of these mechanisms could be potentially applied to precious gem and mineral industries to reduce the risk to human security. At a government level, social clauses in trade agreements could be applied, e.g., to improve labor standards or wages or ensure environmental protection. In the future, the Jewelry Development Impact Index, as based on the methodology proposed in this paper, could provide helpful indicators for which categories of human security are most at risk in a given country, so that these areas can be improved. National civil society actors could develop codes of conduct for their respective national industries based on those areas determined to be at high risk by the index. While in South Africa platinum mining companies engage extensively in CSR via social labor plans (i.e., business driven codes of conduct), the index could also provide an international comparison to other industries, such that companies are driven through competition to further improve their industry standards. Global framework agreements could also be an effective route for enforcing human security standards. In countries, such as South Africa, where transnational companies operate much of the mining industry, international trade unions could collaborate with these companies to set, enforce, and monitor higher standards of human security in the value chain.

10.2 Value Chain Governance and Power Brokers

Depending on the type of value chain typically present in an industry, different types of measures, as part of the broad enforcement mechanisms listed in Section 10.1, could be taken by government, industry actors, or civil society to reduce the risk to human security in a given industry. As demonstrated by the six case studies undertaken in this and the two previous reports, the precious mineral and gem industries present in these countries have been largely dominated by mining and refining, or low level value adding. Because of the nature of these commodities, the value chains tend to be market type, neither dominated by buyers or sellers, but by global price trends. Buyers, i.e., the jewelry manufacturers who purchase the commodity from the mining companies, could potentially try to create business-driven codes of conduct, but this

would require a broad international effort and collaboration between jewelry manufacturers to prevent mining companies from simply switching buyers to avoid the cost of compliance.

However, since price primarily dictates the market, consumers could potentially leverage their buying power to demand higher human security standards in precious mineral and gem value chains. This would require a large scale effort, by governments or civil society, to educate consumers about the source of their jewelry, in combination with an effort to provide labelling for jewelry mined and manufactured according to certain legal and human security standards, as in the Kimberley Process. One challenge to this approach is the indirect access the consumer typically has to the mining industries: manufacturers and retailers act as intermediaries. However, this kind of approach has been successful in other industries, such as the Clean Clothes Campaign, a coalition of civil society actors, trade unions, and businesses working to improve labor standards in the garment industry. By simultaneously working to educate consumers, work with businesses to adopt a code of conduct based on the conventions set out by the ILO, the Clean Clothes Campaign is improving human security standards.

In the precious mineral and gem industries, particularly at the mining and refining level of the value chain, traceability of the commodity to its original source is extremely difficult, adding a significant challenge to any attempt to enforce certain standards of human security. By nature, these precious commodities in their raw from can be smelted and reformed, or cut and changed in shape. Some precious commodities, such as platinum, are difficult to even identify in their raw form, complicating the prevention of illegal exports. However, it could be in the interest of mining companies to collaborate with government and civil society actors to set up tracking and tracing of these commodities: the more the illegally mined raw commodity is exported, the more legally mined commodities must compete with that illegal product, especially in terms of prices.

New technologies, such as Blockchain, which both increases supply chain visibility and the efficiency of keeping records between suppliers and manufacturers, could support such an effort (Dolgui et al., 2018). In general a Blockchain is " a decentralized database that exists as copies in a network of computers" (Dolgui et al., 2018). When a change to the database is made on one computer, that change is registered on all the computers, and a list of transactions alongside the source computer is visible for all parties to the particular Blockchain. If an illegal transaction takes place, it can be easily traced back to its source. Applying this approach to precious mineral

and gem value chains, particularly between mining companies as suppliers, and jewelry manufacturers as buyers, could be an effective route for improving the traceability of precious mineral and gems. Even the Kimberley Process could be made more efficient and accountable by utilization of a Blockchain between participating members. Currently, the Kimberley Process relies on the individual accountability of people to ensure that conflict diamonds never enter legitimate supply chains, but people are fallible: Blockchains could provide improved transparency and accountability in a way that human networks cannot. Governments with a vested interest in curbing illegal mining and export could potentially subsidize Blockchain development in these industries, or provide funding for research and training in this kind of Industry 4.0 technology.

Some jewelry industry actors have already begun to explore the potential of Blockchain technologies to revolutionize transparency and accountability in jewelry supply chains. TrustChain™ is a collaboration between IBM and five jewelry companies, from mining to manufacturing and sale, to establish a Blockchain for all members of their entire supply chain. The collaboration is still in its proof of concept phase (TrustChain Initiative, 2018). De Beers, the international diamond corporation, has also invested in nascent efforts to implement a diamond Blockchain. This Blockchain platform is called Tracr, and has already been used to track 100 diamonds from the mine to the retailer's shelf (De Beers, 2018).

However, this approach would face difficulties in that manufacturing and mining companies would have to collaborate to build longer term relationships built on trust, as utilizing Blockchain essentially means sharing company information or data with a supply chain partner. It would also require some kind of industry cluster or international standards for physically tracing the commodities, such as enforcing a standard bar shape with serial numbers for precious metals. Overall, the use of Blockchains provides the opportunity for legal industry companies to crowd out illegal miners and exporters, and could be a wise investment for both industry actors and national governments.

Chapter 11: Recommendations for Index Development

The new methodology proposed in this report provides a reliable, logical, and transparent assessment of risk posed to human security by precious mineral and gem industries on a country level. The methodology provides a clear framework of what the index attempts to measure, and clear indicators which stakeholders from governmental, business sector, and civil society can develop policy and recommendations for actions to reduce risk to human security and increase the relative benefits of hosting a precious mineral or gem industry. We recommend that this methodological framework be built upon and further refined.

First, the foundation of this methodology rests on the accuracy and adequate breadth of the identified factors relevant to increased or decreased risk. These factors are assessed by the questions in the scoring tables. We recommend that these questions be refined by group discussion with multiple stakeholders in terms of the accuracy of the factors they attempt to measure and their applicability to the relative increase or decrease of risk in each category and subcategory. In addition, we recommend scoring every individual question on a 0 to 5 scale, where 0 represent no risk, and 5 represents high risk.

Second, each possible answer (i.e., scale number from 0 to 5) must be defined in a way that ensures the answers are mutually exclusive and jointly exhaustive. Ideally, answer definitions are be based on quantitative measurements. However, given the nature of what we attempt to assess, such measurement is not always possible. In this case, detailed and specific qualitative definitions must be determined. We recommend avoiding vague and ambiguous answer definitions, and the redefining of unclear definitions posed here in this first draft of the methodological questions.

Third, to achieve this methodological refinement, we recommend research of additional case studies on individual countries and industries to identify further factors which increase or decrease risk to human security. This will ultimately assist with the scoring framework, increase the accuracy of the whole methodological approach, and provide more targeted policy and action guidance for stakeholders. In combination with this, we recommend future practicum groups utilize this first iteration of questions as a so-called “minimum viable product” by sending them to relevant key industry stakeholders for scoring of the next case study countries.

Finally, we recommend engaging an expert in monitoring and impact evaluation methods to assist with the development of the scoring questions and scale definitions. An expert in this area could provide invaluable feedback to the methodological approach as a whole.

Conclusion

South Africa's overall score of 4.58 suggests the country experiences low to moderate levels of risk to human security as a result of the platinum industry. The highest risk is to environment and health. Platinum mining contributes to the destruction of biodiversity and the threat to water security. Its effects on human health, especially for miners and communities near mines, require close monitoring. However, there are also many positives that make platinum mining viable. The industry contributes to almost five percent of total employment in South Africa and creates billions in tax revenue and royalties for the government annually. Additionally, stakeholders in this industry are attempting to further explore avenues through which marginalized groups can participate, including women and historically disadvantaged black South Africans. Existing requirements and quotas in the Mining Charter have opened management positions and mine ownership to disadvantaged persons, which is a positive step forward for the industry.

Madagascar's sapphire mining industry fares slightly worse than South Africa, with an overall risk score of 5.74. The informal nature of the industry plays the biggest role in increasing the risks posed to each human security category. Without improved government regulation over the industry, risks to the environment, workers' health, and human rights will continue to proliferate. Since governing elites' corruption is a contributing factor to the stagnation of the industry, reforms will need to be put in place to ensure existing labor codes are properly applied and monitored specifically for sapphires. Despite these setbacks, the rate at which artisanal sapphire mining has progressed has undoubtedly given many impoverished Malagasy a chance to improve their livelihoods. The industry offers a positive way forward if factors such as beneficiation, formalization through medium-scale and large-scale companies, and greater autonomy for women are addressed and improved. More Malagasy from rural and urban regions alike can potentially reap the benefits of sapphire mining, but this will require continued reforms from the government, help from local and foreign gemology experts, and efforts to include communities that are affected by this industry on a daily basis.

Based on the case studies herein and those from the two previous reports, we have proposed a new methodological approach for constructing the Jewelry Development Impact Index. This methodological approach aims to assess the risk posed to human security by the presence of a

precious mineral or gem industry. The switch to assessing risk instead of attempting to measure impact is a major transition for the development of this index as whole. Each industry is only one part of a larger national puzzle that results in a certain level of human security for each nation's citizens: there are many factors which contribute to national well-being. We strongly recommend future research on the development of this index be directed towards refinement of the scoring questions utilized in our proposed methodology, and improvement of the weighting mechanisms assigned to each score. Further recommendation concerning the methodology are outlined in Chapter 11, while policy suggestions for each sector of human security in both countries are outlined in Section 9.2. We also strongly recommend the continued participation of mining industry and gemology experts in contributing to future case studies and scoring refinement, as they have a wealth of expertise and time spent in the field, and can provide more accurate accounts of events on the ground.

While we strove to assign the most accurate scores possible for sapphire and platinum mining industries, our understanding of the cases comes from published primary and secondary source research supplemented with interviews. Since we were not able to spend any time in either country, the information provided in this study should continue to be refined in the Jewelry Development Impact Index as new information becomes available. To conclude, as the predominant goal of this study is to enable the jewelry industry and connected stakeholders to maximize positive impact, we suggest that future research groups seek formal constructive feedback directly from these actors.

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2. Interviews

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2.2. Interviewee B, personal communication, November 9, 2018.

2.3. Interviewee C, personal communication, November 13, 2018.

2.4. Interviewee D, personal communication, November 4, 2018.
2.5. Interviewee E, personal communication, November 7, 2018.
2.6. Interviewee G, personal communication, November 11, 2018.
2.7. Interviewee H, personal communication, November 8, 2018.
2.8. Interviewee I, personal communication, November 20, 2018.
2.9. Interviewee J, personal communication, November 19, 2018.
2.10. Interviewee K, personal communication, October 25, 2018.
2.11. Interviewee L, personal communication, November 13, 2018.
2.12. Interviewee M, personal communication, November 12, 2018.

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Annex A

Scoring Question Set for Country Level Risk Assessment		
A	Risk to Governance	
A.1.	**Accountability Mechanisms**	**Scoring**
A.1.1.	Are there formal institutions in place to monitor the industry?	Y=0 N=1
A.1.2.	Are violators of the rule of law in regards to the industry held accountable? 0=Always 1=Almost always 2= Usually 3=Sometimes 4=Almost never 5=Never	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
A.1.3.	Are the locations of industry actors, such as mining companies, etc., physically accessible to the government?	Y=0 N=1
A.1.4.	Is there confidence that the government holds industry actors accountable? 5= No confidence that large-scale or small-scale industry actors are held accountable 4= Confidence that only a few selected industry actors are held accountable 3= Confidence that some industry actors are held accountable, but that other industries, whether small-scale or large-scale, are not held accountable 2= Confidence that 60% of industry actors are held accountable 1= Confidence that almost all (80+%) industry actors are held accountable, including small-scale miners 0 = Confidence that all industry actors are held accountable	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
A.1.5.	Are there informal institutions that monitor the industry on a micro-level?	Y=0 N=1
A.2	**Transparency**	
A.2.1.	Is data about industry actors easily accessible and publically available? 5= No data accessible to the public	0-5

	4= Data of only a selected few actors are accessible to the public or only accessible online 3= Half of all data is accessible to the public. Information on small-scale mining is not accessible to the public 2= Most data is accessible to the public 1= Almost all data is accessible to the public 0 = All data is accessible to public)	0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
A.2.2.	Is the government a participant member of the Open Government Partnership?	Y=0 N=1
A.2.3.	Are there any civil society actors focused on industry issues present? 0= Yes, civil society around these industry issues and in general is extremely robust. 1= Yes, civil society around these industry issues is robust. 2= Yes, civil society around these industry issues is present and active. 3= Yes, civil society around these industry issues is present. 4= No, civil society is present in the country, but no actors focus on industry issues. 5= No, there is no civil society in the country.	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
A.2.4.	Is information about the issuing of prospecting and mining permits open and available to the public?	Y=0 N=1
A.2.5.	Does the government have a framework to ensure the traceability of the mined resources?	Y=0 N=1
A.2.6	Are whistleblowers in the industry protected under the law?	Y=0 N=1
A.2.7	Is the country a signatory to the Extractive Industries Transparency Initiative (EITI)?	Y=0 N=1
A.3	**Corruption Prevention**	
A.3.1.	What is the country's Corruption Perceptions Index score? 0= 90-100 CPI 1= 71-90 CPI 2= 61-70 CPI 3= 41-60 CPI 4= 21-40 CPI 5= 0-20 CPI	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
A.3.2.	Are there anti-corruption laws specific to the industry?	Y=0 N=1
A.3.3.	Are anti-corruption laws enforced in relation to the industry? 0=Always 1=Almost always	0-5 0=0 1=0.2

	2= Usually 3=Sometimes 4=Almost never 5=Never	2=0.4 3=0.6 4=0.8 5=1
A.3.4.	Do government officials publicly disclose their finances? 0=Always 1=Almost always 2= Usually 3=Sometimes 4=Almost never 5=Never	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
A.3.5.	Does rent-seeking have a presence in the industry?	Y=1 N=0
A.4	**Industry Regulations**	
A.4.1.	Is there a government body or structure that establishes industry regulations?	Y=0 N=1
A.4.2.	Does the government enforce industry regulations? 0=Always 1=Almost always 2= Usually 3=Sometimes 4=Almost never 5=Never	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
A.4.3.	Are there penalties for violating industry regulations?	Y=0 N=1
A.4.4.	Are industry actors incentivized, either in terms of financial returns or threat of prosecution, to abide by industry regulations?	Y=0 N=1
A.4.5.	Is the process of obtaining permits or licenses related to the industry accessible?	Y=0 N=1
A.4.6.	Is the process of obtaining permits or licenses related to the industry timely?	Y=0 N=1
A.5	**Criminal Organizations**	
A.5.1.	Are there credible reports of international criminal organizations being active in the illegal industry?	N=0 Y= 1

A.5.2.	Are there credible reports of terrorist organizations being active in the illegal industry?	N=0 Y= 1
A.5.3.	Are there credible reports of national or local criminal organizations being active in the illegal industry?	N=0 Y= 1
A.5.4	Are there credible reports of government involvement in criminal activity related to the industry?	N=0 Y=1

B	Risk to Economy	
B.1.	**Industry Employment**	**Scoring**
B.1.1.	Is the majority (more than 60%) of the industry formalized?	Y=0 N=1
B.1.2.	Is the potential income for most workers in the industry equal to or higher than the country average?	Y=0 N=1
B.1.3.	What percentage of the country's entire labor force is directly and indirectly employed in the industry? 0= 10% or more of the country's entire labor force 1= 5-9.99% of the country's entire labor force 2= 3.0-4.99% of the country's entire labor force 3= 2-2.99% of the country's entire labor force 4= 1-1.99% of the country's entire labor force 5= 0-0.99% of the country's entire labor force	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
B.1.4.	Do companies in the industry hire the majority (more than 60%) of their employees locally, i.e., employees are citizens of the country?	Y=0 N=1
B.1.5.	Does the work offered in this industry provide a reliable income?	Y=0 N=1
B.2	**Fiscal Sustainability**	
B.2.1.	Does the government effectively collect taxes and royalties on the industry? 0=Always 1=Almost always 2= Usually 3=Sometimes 4=Almost never 5=Never	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1

B.2.2.	Has the government reinvested revenue earned from the industry back into communities most affected by the industry?	Y=0 N=1
B.2.3.	Has foreign direct investment in this industry generally been rising or stable in the last five years?	Y=0 N=1
B.2.4.	Has global demand for the precious mineral or gem generally been rising or stable in the last five years?	Y=0 N=1
B.2.5.	Is there enough of the natural resource left to ensure production for at least another decade?	Y=0 N=1
B.3	**Beneficiation**	
B.3.1.	Does the industry in the country include any higher value adding activities, e.g., refinement, manufacturing, stone cutting, jewelry crafting, etc., other than mining? 0= The entire value chain (mining, refinement, manufacturing, marketing and sales, and specialized services provided for consumers) of the precious commodity in present in the country. 1= There is mining, refinement, manufacturing, and marketing and sales present in the country. 2=There is mining, refinement, and manufacturing, and little of the precious commodity is exported to other countries in its raw form. 3=There is mining, refinement, and manufacturing, but at least half of the commodity mined is exported to other countries in its raw form. 4=There is mining and refinement, and a small presence of manufacturing in the country, but most of the precious commodity is exported in a raw form to other countries. 5= There is only mining and refining industries present in the country.	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
B.3.2.	Have there been any attempts by the government to create a national beneficiation strategy in this country?	Y=0 N=1
B.3.3.	Have there been any attempts by the business sector to create beneficiation in this country?	Y=0 N=1
B.3.4.	Is the country's labor force perceived as having the right skill sets and education levels necessary to pursue higher value adding activities than mining and refinement?	Y=0 N=1
B.4	**Smuggling and the Informal Economy**	
B.4.1.	What percent of the total industry is formal? Formal means that industry companies operate as legally recognized as businesses. 0= 100% of the industry is formal. 1=90-90.99% of the industry is formal.	0-5 0=0 1=0.2

	2=70-89.99% of the industry is formal. 3=50-69.99% of the industry is formal. 4=20-49.99% of the industry is formal. 5=0-19.99% of the industry is formal.	2=0.4 3=0.6 4=0.8 5=1
B.4.2.	Are there regulations in place to prevent illegal exports?	Y=0 N=1
B.4.3.	Does the government tend to actively prevent illegal exports and smuggling?	Y=0 N=1
B.4.4.	Is the precious mineral or gem easy for regulatory export agents to identify in its raw form?	Y=0 N=1
B.5	**Criminal Non-State Actor and Terrorist Funding**	
B.5.1.	Is the informal industry highly organized?	N=0 Y= 1
B.5.2.	Have there been any credible reports of terrorist involvement in the informal industry?	N=0 Y= 1
B.5.3.	Have there been any credible reports of criminal organizations' involvement in the informal industry?	N=0 Y= 1
B.5.4.	What is the country's score on the Global Terrorism Index? 0= 0-1.67 1= 1.68-3.35 2= 3.36-5.02 3= 5.03-6.69 4= 6.70-8.36 5= 8.34-10	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1

C	Risk to Environment	
C.1.	**Environmental regulatory stringency and enforcement**	**Scoring**
C.1.1.	Does the process to receive a permit to prospect or mine include environmental concerns, including interference with the area's biodiversity, pollution, remediation, etc.?	Y=0 N=1
C.1.2.	Does the government have the capacity to enforce environmental protections? 0= They do have the capacity, and use it with adequate follow up with enforcement. 1= They do have the capacity, and often use it with usual follow up with	0-5 0=0 1=0.2

	enforcement. 2= They do have the capacity, and sometimes use it with occasional follow up with enforcement. 3= They do have the capacity, and rarely use it with no follow up with enforcement. 4= They do have the capacity, but they do not use it. 5= They do not have the capacity and they do not use it.	2=0.4 3=0.6 4=0.8 5=1
C.1.3.	Are there any environmental reserves which are protected from ANY mining activity?	N=0 Y= 1
C.1.4.	Are the mining companies or informal industry actors continuing to mine in protected areas?	N=0 Y=1
C.1.5.	Is the government enforcing regulations to limit or remediate air pollution? 0= Always 1= Almost always 2= Usually 3= Sometimes 4= Almost never 5= Never	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
C.1.6.	Is the government enforcing regulations to limit or remediate water pollution? 0= Always 1= Almost always 2= Usually 3= Sometimes 4= Almost never 5= Never	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
C.1.7.	Is the government enforcing regulations to limit or remediate soil pollution? 0= Always 1= Almost always 2= Usually 3= Sometimes 4= Almost never 5= Never	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
C.2	**Existence and extent of pollution**	
C.2.1.	Does mining or refining of the precious mineral or gem cause air pollution?	N=0 Y=1
C.2.2.	Does mining or refining of the precious mineral or gem cause water pollution?	N=0 Y=1
C.2.3.	Are there regulations in place to limit or remediate air pollution?	Y=0 N=1

C.2.4.	Are there regulations in place to limit or remediate water pollution?	Y=0 N=1
C.2.5.	Does mining or refining of the precious mineral or gem cause soil pollution?	N=0 Y=1
C.2.6.	Are there regulations in place to limit or remediate soil pollution?	Y=0 N=1
C.3	**Risk to Biodiversity**	
C.3.1.	Does mining of precious minerals or gems cause deforestation?	Y=0 N=1
C.3.2.	To what extent does mining of precious minerals or gems contribute to the country's overall deforestation? 0= Mining of the industry does not result in any deforestation. 1= Mining causes 0.01-10% of the total deforestation in the country. 2= Mining causes 10.01-20% of the total deforestation in the country. 3=Mining causes 20.01-30% of the total deforestation in the country. 4=Mining causes 30.01-49.99% of the total deforestation in the country. 5=Mining causes 50% or more of the total deforestation in the country.	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
C.3.3.	Does mining of precious minerals or gems cause erosion?	Y=0 N=1
C.3.4.	Does mining take place in areas designated as highly biodiverse? 0= Mining never takes place in areas in the country designated as highly biodiverse. 1= Mining almost never takes place in areas in the country designated as highly biodiverse. 2= Mining sometimes takes place in areas in the country designated as highly biodiverse. 3= Mining often takes place in areas in the country designated as highly biodiverse. 4= Mining very often takes place in areas in the country designated as highly biodiverse. 5= Mining is taking place in all areas in the country designated as highly biodiverse.	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
C.4	**Post-production planning and remediation**	
C.4.1.	Are there regulations to ensure environmental remediation after a mine closes?	Y=0 N=1
C.4.2.	Does the government ensure and enforce remediation?	0-5

	0= Always 1= Almost always 2= Usually 3= Sometimes 4= Almost never 5= Never	0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
C.4.3.	Is money set aside for remediation of closed mines appropriately distributed, i.e., all the money collected for remediation from the mining company is used for remediation of the specified mine area? 0= Always 1= Almost always 2= Usually 3= Sometimes 4= Almost never 5= Never	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1

D	Risk to Health	
D.1.	**Human Health**	**Scoring**
D.1.1.	Are safety measures taken by mining companies to provide protective equipment and training for miners?	Y=0 N=1
D.1.2.	Is the government contributing to healthcare facilities to combat diseases?	Y=0 N=1
D.1.3	Are mining companies contributing to healthcare facilities to combat diseases?	Y=0 N=1
D.1.4.	Does the act of mining as it occurs in the country pose a risk of bodily harm or fatality?	N=0 Y=1
D.1.5.	Does a health and safety act exist?	Y=0 N=1
D.1.6.	Are mining companies held accountable for the health and safety of their workers? 0= Always 1= Almost always 2= Usually 3= Sometimes 4= Almost never	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1

	5= Never	
D.1.7.	Do workers have health compensation provided by their employer?	Y=0 N=1
D.1.8.	Do miners have access to sanitation in their workplace?	Y=0 N=1
D.2	**Food Security**	
D.2.1.	Is food scarcity a problem for the country as a whole?	N=0 Y=1
D.2.2.	Are arable lands, i.e., lands previously used to grow crops, now being used for mining?	N=0 Y=1
D.2.3.	After a mine is closed, is the community able to use the land for farming?	N=0 Y=1
D.2.4.	Are workers in the country's agricultural labor force leaving agriculture to work in the industry?	N=0 Y=1
D.3	**Water Security**	
D.3.1.	Is water security a problem for the country as a whole?	N=0 Y=1
D.3.2.	Is the industry reusing, using, or purchasing gray water instead of using potable water for mining, refinement, and or manufacturing?	Y=0 N=1
D.3.3.	Do workers in the industry have access to clean drinking water in their workplace and in their respective living accommodations?	Y=0 N=1
D.3.4.	Does the industry require water for refinement and/or mining?	N=0 Y=1

E	Risk to Human Rights	
E.1.	**Workers' rights**	**Scoring**
E.1.1.	Is there a minimum working age in the industry?	Y=0 N=1
E.1.2.	Is there a limit of working hours in the industry?	Y=0 N=1

E.1.3.	Are workers unionized and/or have they organized strikes collectively?	Y=0 N=1
A.1.6.	Does the government provide compensation and resettlement package as prescribed in the law to individuals/families affected by mining?	Y=0 N=1
A.1.7	Do workers have any access to social protections i.e. social insurance, assistance, safety nets? 0= Always 1= Almost always 2= Usually 3= Sometimes 4= Almost never 5= Never	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
A.1.7	Do the workers have legal protections from the government? 0= Always 1= Almost always 2= Usually 3= Sometimes 4= Almost never 5= Never	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
E.2	**Indigenous/ethnic group rights**	
E.2.1.	Is indigenous and/or ethnic groups ability to maintain and practice their culture negatively affected and or inhibited by the presence or operations of the industry? 5= Always 4= Almost always 3= Usually 2= Sometimes 1= Almost never 0= Never	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
E.2.2.	Are certain ethnic and/or indigenous groups excluded from participating in the industry?	Y=1 N=0
E.2.3.	Are indigenous and/or ethnic groups being displaced from their land by the industry?	Y=1 N=0
E.2.4.	Are indigenous and/or ethnic groups barred from employment in this industry, formally and informally?	Y=1 N=0
E.3	**Women's rights**	
E.3.1.	Are women able to participate in this industry equally to men? 0= Always	0-5 0=0

	1= Almost always 2= Usually 3= Sometimes 4= Almost never 5= Never	1=0.2 2=0.4 3=0.6 4=0.8 5=1
E.3.2.	Do women receive economic benefits from this industry equal to men, e.g., in terms of wages or resettlement compensations? 0= Always 1= Almost always 2= Usually 3= Sometimes 4= Almost never 5= Never	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
E.3.3.	Are women free from violence in association with the industry? 0= Always 1= Almost always 2= Usually 3= Sometimes 4= Almost never 5= Never	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
E.3.4.	Are women able to profit from the industry independently of men? 0= Always 1= Almost always 2= Usually 3= Sometimes 4= Almost never 5= Never	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
E.3.5.	Are women/girls sexually exploited in direct or indirect connection, e.g., concentrated presence of miners in mining towns, with the industry? 5= Always 4= Almost always 3= Usually 2= Sometimes 1= Almost never 0= Never	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
E.4	**Children's rights**	
E.4.1.	Are children subject to forced labor in the industry? 5= Always 4= Almost always 3= Usually	0-5 0=0 1=0.2 2=0.4

	2= Sometimes 1= Almost never 0= Never	3=0.6 4=0.8 5=1
E.4.2.	Are children denied education because of this industry?	Y=1 N=0
E.4.3.	Are children's health or mental well-being threatened in some way because of this industry? 5= Always 4= Almost always 3= Usually 2= Sometimes 1= Almost never 0= Never	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
E.4.4.	Does the government have laws to protect children's rights in general and or specific to the industry?	Y=0 N=1
E.4.5.	Are children's physical rights violated because of the industry? (including harmful practices based on tradition, culture, religion, or superstition)	Y=1 N=0
E.4.6	Are children sexually exploited in direct or indirect connection to the industry? 5= Always 4= Almost always 3= Usually 2= Sometimes 1= Almost never 0= Never	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1
E.5	**Freedom from violence**	
E.5.1.	Has violence/conflict emerged as the result of the industry, e.g., from worker protests, illegal mining, etc.?	Y=1 N=0
E.5.2.	Has human trafficking increased as the result of this industry?	N=0 Y=1
E.5.3.	Has domestic violence increased as the result of this industry, e.g., as a result of male miner's behavior at home and with "hot money"?	N=0 Y=1
E.5.4.	Do communities in or around industry mining sites feel less secure? 5= Always 4= Almost always 3= Usually 2= Sometimes 1= Almost never 0= Never	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1

E.5.5.	Does the government actively intervene to prevent or mitigate violence resulting from the presence of the industry? 0= Always 1= Almost always 2= Usually 3= Sometimes 4= Almost never 5= Never	0-5 0=0 1=0.2 2=0.4 3=0.6 4=0.8 5=1

Annex B

A	Risk to Governance			
A.1.	**Accountability Mechanisms**	Effect on Risk	Subcategory Recommendation	South Africa
A.1.1.	There are formal institutions in place that monitor the industry.	Reduces Risk	None	0
A.1.2.	Violators of the rule of law in regards to the industry are usually held accountable.	Reduces Risk		0.2
A.1.3.	The locations of industry actors, such as mining companies, are physically accessible to the government.	Reduces Risk		0
A.1.4.	The public has confidence that at least 80% of the time industry actors are held accountable.	Reduces Risk		0.2
A.1.5.	There are informal institutions in place, such as those in civil society or communities, that monitor the industry on a micro-level.	Reduces Risk		0
A.2.	**Transparency**	Effect on Risk	Subcategory Recommendation	South Africa
A.2.1.	Almost all data about industry actors are available and accessible to the public.	Reduces Risk	Invest in civil society initiatives which aim to act as third party monitors to the industry or to hold the industry accountable in some way.	0.4
A.2.2.	The South African government is a participant member of the Open Government Partnership.	Reduces Risk		0
A.2.3.	Civil society around this industry is present and active	Reduces Risk		0.4
A.2.4.	Information about the issuing of prospecting and mining permits is open and available to the public.	Reduces Risk	Participate in the EITI to improve effective and transparent oversight of the industry.	0
A.2.5.	The government does not have framework in place to ensure the traceability of platinum from mining to export.	Increases Risk		1
A.2.6	Whistleblowers in the industry are protected under the law.	Reduces Risk		0
A.2.7	South Africa is not a signatory to the Extractive Industries Transparency Initiative (EITI).	Increases Risk		1
A.3.	**Corruption Prevention**	Effect on Risk	Subcategory Recommendation	South Africa
A.3.1.	South African's Corruption Perceptions Index score is between 41-60.	Increases Risk	Enforce public disclosure of all public officials finances.	0.6
A.3.2.	There a robust framework for anti-corruption laws in South Africa.	Reduces Risk		0
A.3.3.	Anti-corruption laws sometimes enforced in relation to the industry.	Increases Risk		0.6

A.3.4.	Government officials usually publicly disclose their finances.	Reduces Risk		0.4
A.3.5.	Rent-seeking does not have a presence in the industry.	Reduces Risk		0
A.4.	**Industry Regulations**	Effect on Risk	Subcategory Recommendation	South Africa
A.4.1.	There is a government body or structure that establishes industry regulations.	Reduces Risk	Streamline the process of obtaining permits by investing in staff training in anti-corruption and technology, e.g., online application process.	0
A.4.2.	The government almost always enforces industry regulations.	Reduces Risk		0.2
A.4.3.	There are penalties for violating industry regulations.	Reduces Risk		0
A.4.4.	Industry actors incentivized, either in terms of financial returns or threat of prosecution, to abide by industry regulations.	Reduces Risk		0
A.4.5.	The process of obtaining permits or licenses related to the industry is accessible.	Reduces Risk		0
A.4.6.	The process of obtaining permits or licenses related to the industry is not timely.	Increases Risk		1
A.5.	**Criminal Organizations**	Effect on Risk	Subcategory Recommendation	South Africa
A.5.1.	There are credible reports of international criminal organizations being active in the illegal industry.	Increases Risk	Continue to invest in efforts to eradicate criminal syndicates and terrorist organizations.	1
A.5.2.	There are credible reports of terrorist organizations being active in the illegal industry.	Increases Risk		1
A.5.3.	There are credible reports of national or local criminal organizations being active in the illegal industry.	Increases Risk		1
A.5.4.	There are credible reports of government involvement in criminal activity related to the industry.	Increases Risk		1
B	**Risk to Economy**			
B.1.	**Industry Employment**	Effect on Risk	Subcategory Recommendation	South Africa
B.1.1.	The majority (more than 60%) of the platinum industry in South Africa is formalized.	Reduces Risk	None	0
B.1.2.	The potential income for most workers in the industry is equal to or higher than the country average.	Reduces Risk		0
B.1.3.	5-9.99% of the country's entire labor force is directly and indirectly employed in the platinum industry	Reduces Risk		0.2
B.1.4.	Companies in the industry hire the majority	Reduces Risk		0

	(more than 60%) of their employees locally, i.e., employees are citizens of the country.			
B.1.5.	The work offered in this industry provides a reliable income.	Reduces Risk		0
B.2	**Fiscal Sustainability**	Effect on Risk	Subcategory Recommendation	South Africa
B.2.1.	The government almost always effectively collects taxes and royalties on the industry. In South Africa the exception is the illegal platinum mining industry, which provides no tax revenue or royalties to the government.	Reduces Risk	None	0.2
B.2.2.	The government has reinvested revenue earned from the industry back into communities most affected by the industry.	Reduces Risk		0
B.2.3.	Foreign direct investment in this industry has not generally been rising or stable in the last five years.	Increases Risk		1
B.2.4.	Global demand for platinum has not generally been rising or stable in the last five years.	Increases Risk		1
B.2.5.	There enough platinum left to ensure production for at least another decade.	Reduces Risk		0
B.3	**Beneficiation**	Effect on Risk	Subcategory Recommendation	South Africa
B.3.1.	There is mining and refinement, and a small presence of manufacturing in the country, but most of the precious commodity is exported in a raw form to other countries.	Increases Risk	Foster platinum jewelry beneficiation by investing in labor force training and skill development for higher value adding activities.	0.8
B.3.2.	There have been attempts by the government to create a national beneficiation strategy for platinum.	Reduces Risk		0
B.3.3.	There have been attempts by the business sector to create platinum jewelry beneficiation in South Africa.	Reduces Risk		0
B.3.4.	The South Africa's labor force is not perceived as having the right skill sets and education levels necessary to pursue higher value adding activities than mining and refinement.	Increases Risk		1
B.4	**Smuggling and the Informal Economy**	Effect on Risk	Subcategory Recommendation	South Africa
B.4.1.	70-89.99% of the platinum industry in South Africa is formal.	Reduces Risk	Ensure collaboration between the government and the business sector to create a track and trace system for raw, legally mined platinum intended for export.	0.2
B.4.2.	There are regulations in place to prevent illegal exports.	Reduces Risk		0
B.4.3.	The government does not tend to actively prevent illegal exports and smuggling of platinum in South Africa.	Increases Risk	Raise consumer awareness about platinum sourcing to create a demand for platinum	1

			jewelry which has been legally mined and exported by companies who can be held accountable.	
B.4.4.	Platinum is not easy for regulatory export agents to identify in its raw form.	Increases Risk		1
B.5	**Criminal Non-State Actor and Terrorist Funding**	Effect on Risk	Subcategory Recommendation	South Africa
B.5.1.	South Africa's informal industry is highly organized.	Increases Risk	Continue efforts on the part of the government to eliminate, disrupt, or formalize the informal mining industry.	1
B.5.2.	There have been credible reports of terrorist involvement in the informal industry.	Increases Risk		1
B.5.3.	There have been credible reports of criminal organizations' involvement in the informal industry.	Increases Risk		1
B.5.4.	South Africa's score on the Global Terrorism Index is between 3.36-5.02 out of 10, where 10 represents a high level of terrorist activity.	Reduces Risk		0.4
C	**Risk to Environment**			
C.1.	**Environmental regulatory stringency and enforcement**	Effect on Risk	Subcategory Recommendations	South Africa
C.1.1.	The process to receive a permit to prospect or mine in South Africa includes environmental concerns.	Reduces Risk	Enforce the environmental laws that are in place to help remediate the damage done by air, water, and soil pollution, and protect more biodiverse areas.	0
C.1.2.	The South African government does not have the capacity to enforce environmental protections in regards industry.	Increases Risk		1
C.1.3.	There are environmental reserves in South Africa which are protected from ANY mining activity.	Reduces Risk		0
C.1.4.	The industry mining companies or informal industry actors do not mine in protected areas.	Reduces Risk		0
C.1.5.	The government never enforces regulations to limit or remediate air pollution.	Increases Risk		1
C.1.6.	The government never enforces regulations to limit or remediate water pollution.	Increases Risk		1
C.1.7.	The government never enforces regulations to limit or remediate soil pollution.	Increases Risk		1
C.2	**Existence and extent of pollution**	Effect on Risk	Subcategory Recommendations	South Africa
C.2.1.	Platinum mining in South Africa causes air pollution.	Increases Risk	Create and enforce soil pollution regulations.	1
C.2.2.	Platinum mining in South Africa causes water pollution.	Increases Risk		1

C.2.3.	There are regulations in place to limit or remediate air pollution.	Reduces Risk		0
C.2.4.	There are regulations in place to limit or remediate water pollution.	Reduces Risk		0
C.2.5.	Platinum mining in South Africa causes soil pollution.	Increases Risk		1
C.2.6.	There are no regulations in place to limit or remediate soil pollution.	Increases Risk		1
C.3	**Impact on Biodiversity**	Effect on Risk	Subcategory Recommendations	South Africa
C.3.1.	Platinum mining in South Africa causes deforestation.	Increases Risk	None	1
C.3.2.	Platinum mining causes 0.01-10% of the total deforestation in the country.	Reduces Risk		0.2
C.3.3.	Platinum mining in South Africa causes erosion.	Increases Risk		1
C.3.4.	Platinum mining is taking place in all areas of South Africa designated as highly biodiverse.	Increases Risk		1
C.4	**Post-production planning and remediation**	Effect on Risk	Subcategory Recommendations	South Africa
C.4.1.	There are regulations to ensure environmental remediation after a mine closes.	Reduces Risk	None	0
C.4.2.	The government almost never ensures and enforces remediation.	Increases Risk		0.8
C.4.3.	Money set aside for remediation of closed mines is sometime appropriately distributed, i.e., all the money collected for remediation from the mining company is sometimes used for remediation of the specified mine area.	Increases Risk		0.6
D	**Risk to Health**			
D.1.	**Human Health**	Effect on Risk	Subcategory Recommendation	South Africa
D.1.1.	Safety measures are taken by mining companies to provide protective equipment and training for miners.	Reduces Risk	None	0
D.1.2.	The government contributes to healthcare facilities for platinum miners to combat diseases.	Reduces Risk		0
D.1.3	Platinum mining companies contribute to healthcare facilities for platinum miners to combat diseases.	Reduces Risk		0
D.1.4.	The act of platinum mining as it occurs in South Africa poses a risk of bodily harm or fatality to miners.	Increases Risk		1

D.1.5.	A health and safety act exists specifically for the mining industry in South Africa.	Reduces Risk		0
D.1.6.	Platinum mining companies are sometimes held accountable for the health and safety of their workers.	Increases Risk		0.6
D.1.7.	Industry workers have health compensation provided by their employers in South Africa.	Reduces Risk		0
D.1.8.	Miners have access to sanitation in their workplace.	Reduces Risk		0
D.2	**Food Security**	Effect on Risk	Subcategory Recommendations	South Africa
D.2.1.	Food scarcity is not a problem for South Africa as a whole.	Reduces Risk	Enforce the remediation of previously mined lands, so as to assist the development of the agricultural sector, and pursue job creation for the communities surrounding the former mining site.	0
D.2.2.	Arable lands, i.e., lands previously used to grow crops, are now being used for platinum mining in South Africa.	Increases Risk		1
D.2.3.	After a platinum mine is closed, the community is not able to use that land for farming.	Increases Risk		1
D.2.4.	Workers in South Africa's agricultural labor force are leaving the agricultural sector to work in platinum mining.	Increases Risk		1
D.3	**Water Security**	Effect on Risk	Subcategory Recommendations	South Africa
D.3.1.	Water security is a problem for South Africa as a whole.	Increases Risk	Enforce the restriction of potable water use, through Water Use Licenses.	1
D.3.2.	The industry is reusing, using, or purchasing gray water instead of using potable water for mining, refinement, and or manufacturing.	Reduces Risk		0
D.3.3.	Workers in the industry do not have access to clean drinking water in their workplace and in their respective living accommodations.	Increases Risk	Include filtration of the potable water for communities surrounding the mines as a part of industry actors' corporate social responsibility.	1
D.3.4.	The industry requires water for refinement and/or mining.	Increases Risk		1
E	**Risk to Human Rights**			
E.1.	**Workers' rights**	Effect on Risk	Subcategory Recommendation	South Africa
E.1.1.	There is a minimum working age in the industry.	Reduces Risk	Invest in multi-stakeholder discussions to actualize the targets set by the Mining Charter.	0
E.1.2.	There is a limit to working hours in the industry.	Reduces Risk		0
E.1.3.	Workers are unionized and/or have organized strikes collectively.	Reduces Risk		0
E.1.4.	The government or industry actors provide compensation and resettlement packages as prescribed in the law to individuals/families affected by mining.	Reduces Risk		0
E.1.5	Workers usually have access to social protections i.e. social insurance, assistance,	Reduces Risk		0.4

	safety nets.			
E.1.6	Workers almost always have legal protections provided by the government.	Reduces Risk		0.2
E.2	**Indigenous/ethnic group rights**	Effect on Risk	Subcategory Recommendation	South Africa
E.2.1.	Indigenous and/or ethnic groups are almost always able to maintain and practice their culture despite the presence of the industry.	Reduces Risk	None	0.2
E.2.2.	No ethnic and/or indigenous groups are excluded from participating in the industry.	Reduces Risk		0
E.2.3.	Indigenous and/or ethnic groups have been pushed out of their land due to the industry.	Increases Risk		1
E.2.4.	Indigenous and/or ethnic groups are not barred from employment in this industry, formally or informally.	Reduces Risk		0
E.3	**Women's rights**	Effect on Risk	Subcategory Recommendation	South Africa
E.3.1.	Women are usually able to participate in this industry equally to men.	Reduces Risk	None	0.4
E.3.2.	Women almost always receive economic benefits from this industry equal to men.	Reduces Risk		0.2
E.3.3.	Women are almost always free from violence in association with the industry.	Reduces Risk		0.2
E.3.4.	Women are able to profit from the industry separately from men.	Reduces Risk		0
E.3.5.	Women sexually are never exploited in connection with the industry.	Reduces Risk		0
E.4	**Children's rights**	Effect on Risk	Subcategory Recommendation	South Africa
E.4.1.	Children are never subject to forced labor in the industry.	Reduces Risk	Improve the process of negotiating compensation and resettlement packages for communities and eliminate forced displacement of communities.	0
E.4.2.	Children are never denied education because of this industry.	Reduces Risk		0
E.4.3.	Children’s health or mental well-being is sometimes threatened due to this industry as a result of forced displacement.	Increases Risk		0.4
E.4.4.	The government has laws to protect children’s rights in connection to the industry.	Reduces Risk		0
E.4.5.	Children’s physical rights are not violated because of the industry.	Reduces Risk		0
E.4.6	Children are never sexually exploited in relation to the industry.	Reduces Risk		0
E.5	**Freedom from violence**	Effect on Risk	Subcategory Recommendation	South Africa
E.5.1.	Violence/conflict has emerged as the result of the industry.	Increases Risk	None	1
E.5.2.	Human trafficking has not increased as the result of this industry.	Reduces Risk		0
E.5.3.	Domestic violence has not increased as the	Reduces Risk		0

	result of this industry.			
E.5.4.	Communities in or around mining sites sometimes feel less secure due to this industry.	Increases Risk		0.4
E.5.5.	There almost always has been government intervention to subdue/eliminate existing violence in the industry.	Reduces Risk		0.2

Annex C

A	Risk to Governance			
A.1.	**Accountability Mechanisms**	Effect on Risk	Subcategory Recommendation	Madagascar
A.1.1.	There are formal institutions in place that monitor the industry.	Reduces Risk	None	0
A.1.2.	Violators of the rule of law in regards to the industry are almost never held accountable.	Increases Risk		0.8
A.1.3.	The locations of industry actors, such as mining companies, etc., are physically accessible to the government.	Reduces Risk		0
A.1.4.	The public has confidence that only a few selected industry actors are held accountable.	Increases Risk		0.8
A.1.5.	There are informal institutions in place, such as those in civil society or communities, that monitor the industry on a micro-level.	Reduces Risk		0
A.2.	**Transparency**	Effect on Risk	Subcategory Recommendation	Madagascar
A.2.1.	Data of only a selected few actors are accessible to the public or only accessible online.	Increases Risk	Improve public access to government information and government officials' finances.	0.8
A.2.2.	The Malagasy government is not a participant member of the Open Government Partnership.	Increases Risk		1
A.2.3.	Civil society actors are present and active that are focused on industry issues.	Reduces Risk		0.4
A.2.4.	Information about the issuing of prospecting and mining permits is open and available to the public.	Reduces Risk		0
A.2.5.	The Malagasy government does not have framework in place to ensure the traceability of sapphires from mining to export.	Increases Risk		1
A.2.6	Whistleblowers in the industry are protected under the law.	Reduces Risk		0
A.2.7	Madagascar is a signatory to the Extractive Industries Transparency Initiative (EITI).	Reduces Risk		0
A.3.	**Corruption Prevention**	Effect on Risk	Subcategory Recommendation	Madagascar
A.3.1.	Madagascar's Corruption Perceptions Index score is between 21-40.	Increases Risk	Implement a regular annual assessment of the National Anti-Corruption Strategy.	0.8
A.3.2.	There is a robust framework for anti-corruption laws in Madagascar.	Reduces Risk		0
A.3.3.	Anti-corruption laws are sometimes enforced in relation to the industry.	Increases Risk		0.6
A.3.4.	Malagasy government officials sometimes	Increases Risk		0.6

	publicly disclose their finances.			
A.3.5.	There is a presence of rent-seeking in the industry.	Increases Risk		1
A.4.	**Industry Regulations**	Effect on Risk	Subcategory Recommendation	Madagascar
A.4.1.	There is a government body or structure that establishes industry regulations.	Reduces Risk	Improve the accessibility of acquiring a mining license, specifically for miners in the ASM industry.	0
A.4.2.	The Malagasy government almost never enforces industry regulations.	Increases Risk		0.8
A.4.3.	There are penalties for violating industry regulations.	Reduces Risk		0
A.4.4.	The industry actors are not incentivized, either in terms of financial returns or threat of prosecution, to abide by industry regulations.	Increases Risk		1
A.4.5.	The process of obtaining permits or licenses related to the industry is not accessible.	Increases Risk		1
A.4.6.	The process of obtaining permits or licenses related to the industry is not timely.	Increases Risk		1
A.5.	**Criminal Organizations**	Effect on Risk	Subcategory Recommendation	Madagascar
A.5.1.	There are credible reports of international criminal organizations being active in the illegal industry.	Reduces Risk	None	0
A.5.2.	There are credible reports of terrorist organizations being active in the illegal industry.	Reduces Risk		0
A.5.3.	There are credible reports of national or local criminal organizations being active in the illegal industry.	Reduces Risk		0
A.5.4	There are credible reports of government involvement in criminal activity related to the industry.	Reduces Risk		0
B	**Risk to Economy**			
B.1.	**Industry Employment**	Effect on Risk	Subcategory Recommendation	Madagascar
B.1.1.	The majority (more than 60%) of the industry is not formalized.	Increases Risk	None	1
B.1.2.	The potential income for most workers in the industry is equal to or higher than the average country income.	Reduces Risk		0
B.1.3.	10% or more of the country's entire labor force is directly and indirectly employed in the industry.	Reduces Risk		0
B.1.4.	Companies in the industry hire the majority (more than 60%) of their employees locally, i.e., employees are citizens of the country.	Reduces Risk		0
B.1.5.	The work offered in this industry does not provide a reliable income.	Increases Risk		1

B.2.	Fiscal Sustainability	Effect on Risk	Subcategory Recommendation	Madagascar
B.2.1.	The Malagasy government almost never effectively collects taxes and royalties on the industry.	Increases Risk	Resume the issuing of permits, streamline and incentivize permit applications, so as to further formalize the industry and increase the revenue collected through royalties.	0.8
B.2.2.	The Malagasy government has not reinvested revenue earned from the industry back into communities that have been most affected by the industry.	Increases Risk		1
B.2.3.	Foreign direct investment in this industry generally has not been rising or stable in the last five years.	Increases Risk		1
B.2.4.	The global demand for sapphires generally has been rising or stable in the last five years.	Reduces Risk		0
B.2.5.	There are enough sapphires left to ensure production for at least another decade.	Reduces Risk		0
B.3.	**Beneficiation**	Effect on Risk	Subcategory Recommendation	Madagascar
B.3.1.	There is mining and refinement, and a small presence of manufacturing in the country, but most of the sapphires are exported in a raw form to other countries.	Increases Risk	Invest industry revenues into the development of the beneficiation sector.	0.8
B.3.2.	There have been attempts by the government to create a national beneficiation strategy in this country.	Reduces Risk		0
B.3.3.	There have not been any attempts by the business sector to create beneficiation in this country.	Increases Risk		1
B.3.4.	Madagascar's labor force is not perceived as having the right skill sets and education levels necessary to pursue higher value adding activities than mining and refinement.	Increases Risk		1
B.4.	**Smuggling and the Informal Economy**	Effect on Risk	Subcategory Recommendation	Madagascar
B.4.1.	0-19.99% of the industry is formal.	Increases Risk	None	1
B.4.2.	There are regulations in place to prevent illegal exports.	Reduces Risk		0
B.4.3.	The Malagasy government does not tend to actively prevent illegal exports and smuggling.	Increases Risk		1
B.4.4.	Sapphires are easy for regulatory export agents to identify in its raw form.	Reduces Risk		0
B.5.	**Criminal Non-State Actor and Terrorist Funding**	Effect on Risk	Subcategory Recommendation	Madagascar
B.5.1.	The informal industry is not highly organized.	Increases Risk	None	1
B.5.2.	There have been credible reports of terrorist involvement in the informal industry.	Reduces Risk		0

B.5.3.	There have been credible reports of criminal organizations' involvement in the informal industry.	Reduces Risk		0
B.5.4.	Madagascar's score on the Global Terrorism Index is 1.68-3.35.	Reduces Risk		0.2
C	**Risk to Environment**			
C.1.	**Environmental regulatory stringency and enforcement**	Effect on Risk	Subcategory Recommendations	Madagascar
C.1.1.	The process to receive a permit to prospect or mine include environmental concerns.	Reduces Risk	Increase government presence during mining rushes, particularly surrounding protected areas. Improve the process to acquire a mining license. Establish incentives for miners to acquire a licenses and adhere to environmental protections. Continue government investigations of the recently protected areas and areas where mining licenses were distributed before the protected areas were established.	0
C.1.2.	The Malagasy government does have the capacity, and sometimes uses it with occasional follow up with enforcement of environmental protections.	Reduces Risk		0.4
C.1.3.	There are environmental reserves which are protected from any mining activity.	Reduces Risk		0
C.1.4.	The informal industry actors continue to mine in protected areas.	Increases Risk		1
C.1.5.	The Malagasy government never enforces regulations to limit or remediate air pollution.	Increases Risk		1
C.1.6.	The Malagasy government never enforces regulations to limit or remediate water pollution.	Increases Risk		1
C.1.7.	The Malagasy government never enforces regulations to limit or remediate soil pollution.	Increases Risk		1
C.2	**Existence and extent of pollution**	Effect on Risk	Subcategory Recommendations	Madagascar
C.2.1.	Mining or refining of sapphires causes air pollution.	Increases Risk	Enforce regulations to limit or remediate air, water and soil pollution.	1
C.2.2.	Mining or refining of sapphires causes water pollution.	Increases Risk		1
C.2.3.	There are regulations in place to limit or remediate air pollution.	Reduces Risk		0
C.2.4.	There are regulations in place to limit or remediate water pollution.	Reduces Risk		0
C.2.5.	Mining or refining of sapphires causes soil pollution.	Increases Risk		1
C.2.6.	There are regulations in place to limit or remediate soil pollution.	Reduces Risk		0
C.3	**Impact on Biodiversity**	Effect on Risk	Subcategory Recommendations	Madagascar
C.3.1.	Mining of sapphires causes deforestation.	Increases Risk	Increase regulations regarding	1

C.3.2.	Mining of sapphires contributes 0.01-10% of the total deforestation in the country.	Reduces Risk	mining in highly biodiverse areas	0.2
C.3.3.	Mining of sapphires causes erosion.	Increases Risk		1
C.3.4.	Sapphire mining is taking place in all areas in the country designated as highly biodiverse.	Increases Risk		1
C.4	**Post-production planning and remediation**	Effect on Risk	Subcategory Recommendations	Madagascar
C.4.1.	There are regulations to ensure environmental remediation after a mine closes.	Reduces Risk	Ensure and enforce remediation of mining sites and set aside money to be properly used for remediation	0
C.4.2.	The Malagasy government almost never ensures nor enforces remediation.	Increases Risk		0.8
C.4.3.	Money is almost never set aside for remediation of closed mines nor appropriately distributed, i.e., all the money collected for remediation from the mining company is used for remediation of the specified mine area.	Increases Risk		0.8
D	**Risk to Health**			
D.1.	**Human Health**	Effect on Risk	Subcategory Recommendation	Madagascar
D.1.1.	Safety measures are not taken by mining companies to provide protective equipment and training for the miners.	Increases Risk	Provide free or low-cost safety gear as well as safety information to miners. Open health clinics in rural communities and mining sites. Invest in water and sanitation systems in rural communities and mining sites.	1
D.1.2.	The Malagasy government is not contributing to healthcare facilities for miners to combat diseases.	Increases Risk		1
D.1.3	In the industry healthcare facilities are not provided to combat diseases.	Increases Risk		1
D.1.4.	The act of mining as it occurs in Madagascar poses a risk of bodily harm or fatality.	Increases Risk		1
D.1.5.	A health and safety act exists in Madagascar for mining.	Reduces Risk		0
D.1.6.	The industry is sometimes held accountable for the health and safety of their workers.	Increases Risk		0.6
D.1.7.	Workers do not have health compensation provided by their employer.	Increases Risk		1
D.1.8.	Miners do not have access to sanitation in their workplace.	Increases Risk		1
D.2	**Food Security**	Effect on Risk	Subcategory Recommendations	Madagascar
D.2.1.	Food scarcity is a problem for Madagascar as a whole.	Increases Risk	None	1
D.2.2.	Arable lands, i.e., lands previously used to grow crops, are not being used for mining.	Reduces Risk		0
D.2.3.	After a mine is closed, the community is not able to use that land for farming.	Increases Risk		1

D.2.4.	The workers in Madagascar's agricultural labor force are leaving the agricultural sector to work in the industry.	Increases Risk		1
D.3	**Water Security**	Effect on Risk	Subcategory Recommendations	Madagascar
D.3.1.	Water security is a problem for Madagascar as a whole.	Increases Risk	None	1
D.3.2.	The industry is not reusing, using, or purchasing gray water instead of using potable water for mining, refinement, and or manufacturing.	Increases Risk		1
D.3.3.	Workers in the industry do not have access to clean drinking water in their workplace and in their respective living accommodations.	Increases Risk		1
D.3.4.	The industry requires water for refinement and/or mining.	Increases Risk		1
E	**Risk to Human Rights**			
E.1.	**Workers' rights**	Effect on Risk	Subcategory Recommendation	Madagascar
E.1.1.	There is no minimum working age in the industry.	Increases Risk	Formalize the industry and address human rights issues through policies and training related to health, safety, labor rights, discrimination, and sexual exploitation. Enforce buyers/intermediaries to conduct training with employees (miners) on good labor practices and clear expectations of contracts.	1
E.1.2.	There is no limit to the number of working hours for miners in the industry.	Increases Risk		1
E.1.3.	Workers are not unionized nor have organized strikes collectively.	Increases Risk		1
E.1.4.	The Malagasy government does not provide compensation nor resettlement packages as prescribed in the law to individuals/families affected by mining.	Increases Risk		1
E.1.5	Miners almost never have access to social protections i.e. social insurance, assistance, safety nets.	Increases Risk		0.8
E.1.6	The miners almost never have legal protections provided by the Malagasy government.	Increases Risk		0.8
E.2	**Indigenous/ethnic group rights**	Effect on Risk	Subcategory Recommendation	Madagascar
E.2.1.	Usually indigenous and/or ethnic groups are able to maintain and practice their culture despite the presence of the industry.	Reduces Risk	Improve enforcement of legally coded protections in this industry for indigenous/particular ethnic groups.	0.4
E.2.2.	Certain ethnic and/or indigenous groups are not excluded from participating in the industry.	Reduces Risk		0
E.2.3.	Indigenous and/or ethnic groups are not being pushed out of their land due to the industry.	Reduces Risk		0
E.2.4.	Indigenous and/or ethnic groups are not barred from employment in this industry, both formally and informally.	Reduces Risk		0

E.3	Women's rights	Effect on Risk	Subcategory Recommendation	Madagascar
E.3.1.	Women sometimes participate in this industry equally to men.	Increases Risk	Improve enforcement of legally coded protections in this industry for women.	0.6
E.3.2.	Women sometimes receive economic benefits from this industry equal to men.	Increases Risk		0.6
E.3.3.	Women are usually free from violence in association with the industry.	Reduces Risk		0.4
E.3.4.	Women are sometimes able to profit from the industry separately from men.	Increases Risk		0.6
E.3.5.	Women are sometimes sexually exploited in connection with the industry.	Reduces Risk		0.4
E.4	**Children's rights**	Effect on Risk	Subcategory Recommendation	Madagascar
E.4.1.	Children are usually subject to forced labor in the industry.	Increases Risk	Improve enforcement of legally coded protections in this industry for children.	0.6
E.4.2.	Children are not denied education because of this industry.	Reduces Risk		0
E.4.3.	Children’s health or mental well-being is sometimes threatened due to this industry.	Reduces Risk		0.4
E.4.4.	The government has laws to protect children’s rights in the industry.	Reduces Risk		0
E.4.5.	Children’s physical rights are violated because of the industry, i.e., protection from procedures.	Increases Risk		1
E.4.6	Children are sometimes sexually exploited in relation to the industry.	Reduces Risk		0.4
E.5	**Freedom from violence**	Effect on Risk	Subcategory Recommendation	Madagascar
E.5.1.	Violence/conflict emerged as a result of the sapphire industry.	Increases Risk	Strengthen the security apparatus in mining areas but ensure local participation and engagement in the process, to understand the core of the insecurity.	1
E.5.2.	Human trafficking did not increase as a result of the sapphire industry.	Reduces Risk		0
E.5.3.	Domestic violence did not increase as a result of the sapphire industry.	Reduces Risk		0
E.5.4.	Communities in or around mining sites almost always feel less secure due to the sapphire industry.	Increases Risk		0.8
E.5.5.	There sometimes has been government intervention to subdue/eliminate any existing violence in the industry.	Increases Risk		0.6