



Economic Contributions of Artisanal and Small-Scale Mining in Kenya: Gold and Gemstones

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Contacts:

Pact Global UK
Ravenswood, Baileys Lane
Westcombe, Somerset BA4 6EN
UK
+44 (0) 7584651984
pactuk@pactworld.org
djarman@pactworld.org

Alliance for Responsible Mining – ARM
Calle 32 B SUR # 44 A 61
Envigado
Colombia
+57 (4) 332 47 11
geraudbrunel@responsiblemines.org
marcinpiersiak@responsiblemines.org

Authorship:

This report was prepared by Dr Maria Laura Barreto (team leader, legal aspects), Patrick Schein (economic aspects), Dr Jennifer Hinton (technical and social aspects), and Dr Felix Hruschka (context, mapping and compilation) as part of the EARF project 'Understanding the Economic Contribution of Small-scale Mining in East Africa' covering Kenya, Rwanda, and Uganda.

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About Pact and ARM:

International not-for-profit organisations Pact and ARM are jointly responsible for this report's contents. Both organisations are independent yet partner on a project by project basis to promote and achieve excellence in natural resource management, improve social and environmental responsibility within artisanal and small-scale mining, and assist communities to gain lasting benefit from the more sustainable use of the natural resources around them.

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Abbreviations and Acronyms

AM	artisanal mining
AMDC	African Minerals Development Centre
AME	Asian Metals Exchange
ARM	Alliance for Responsible Mining
ASGM	artisanal and small-scale gold mining
ASM	artisanal and small-scale mining
AUD	Australian dollars
BGR	Bundesanstalt für Geowissenschaften und Rohstoffe (German Federal Institute for Geosciences and Natural Resources)
CANCO	Community Action for Nature Conservation
CASM	Communities and Small-Scale Mining
CBO	community-based organisation
CMA	Chawia Minerals Association
cm	centimetre(s)
CSO	civil society organisation
DDG	OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas
DFID	U.K. Department for International Development
EARF	East Africa Research Fund
EITI	Extractive Industries Transparency Initiative
g	gram(s)
GDP	gross domestic product
GEF	Global Environmental Facility
GEF GOLD	Global Opportunities for Long-term Development of ASGM Sector
GIA	Gemmological Institute of America
GIS	geographic information system
GiZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
GPS	global positioning system
GLR	African Great Lakes Region
GMP	Global Mercury Partnership
GNI	gross national income
GOK	Government of Kenya
GRF	Gender Resource Facility
ha	hectare(s)
HDI	Human Development Index
IANRA	International Alliance on Natural Resources in Africa
ICGLR	International Conference on the Great Lakes Region
ILO	International Labour Organisation
KENRA	Natural Resources Alliance of Kenya
KES	Kenya shilling
kg	kilogramme(s)
KIPPRA	Kenya Institute for Public Policy Research and Analysis
km	kilometre(s)
KNBS	Kenya National Bureau of Statistics
KRA	Kenya Revenue Authority
kVA	kilo-volt-ampere(s)

LBMA	London Bullion Market Association
LSM	large-scale mining
m	metre(s)
MDP	Ministry of Devolution and Planning
MENR	Ministry of Environment and Natural Resources
mm	millimetre(s)
MOM	Ministry of Mining
NEMA	National Environment Management Authority
NGO	non-governmental organisation
OCDC	Osiri Community Development Committee
OECD	Organisation for Economic Co-operation and Development
OHS	occupational health and safety
PAYE	pay as you earn
PPE	personal protective equipment
RCM	ICGLR Regional Certification Mechanism
REE	rare earth elements
RINR	2010 ICGLR Regional Initiative against the Illegal Exploitation of Natural Resources
SACCO	Savings and Credit Cooperative Society
SDC	Swiss Agency for Development and Cooperation
SGBV	sexual and gender-based violence
SSM	small-scale mining
TTCG	Taita Taveta County Government
U.K.	United Kingdom
U.S.	United States
UAE	United Arab Emirates
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNIDO	United Nations Industrial Development Organization
USD	United States dollar
USGS	U.S. Geological Survey
VAT	value added tax
VDS	Vision Delivery Secretariat
Vision	Kenya Vision 2030

Executive Summary

Context

The economic role of artisanal and small-scale mining (ASM) in Kenya is still under-researched and poorly understood by many national and international decision makers. Robust evidence is lacking to comprehend the current economic contribution of ASM in Kenya; how the sector is formally or informally coordinated, as well as how many and which demographic groups are participating.

Kenya is a lower-middle income with an informal sector representing 83% of the country's employment. A wide range of minerals, both metallic and industrial, is known to occur in the country. The Government aims to increase the mining sector's contribution to the gross domestic product (GDP). In 2015, the mining sector's share already reached 0.8% and, the government now aims for 10% by 2030 through value addition and the implementation of the recently approved Mining and Minerals Policy (2016). The Mining and Minerals Policy (a 20 year vision), combined with the new Mining Act outline a long term mining strategy for the country. Although large-scale mining companies operate in the country, ASM continues to remain a significant source of employment for Kenyans. Large-scale mining (LSM) currently employs around 9,000 workers in the country. Although no official data is available, the ASM population was estimated at about 146,000 people in 2012. The sector remains largely informal, but produces around 60% of the country's gemstones, most of its gold, quarried stones and other construction materials.

Kenya recently passed its long-awaited Mining Act (12/2016) and new mining regulations are in an advanced phase of drafting and public consultation. These two legal instruments lay out the new legal framework for the mining sector in the country, including the ASM sector. However, other laws and regulations will need to be promulgated to fully develop and refine this framework.

Purpose

It is against this backdrop that the UK Department for International Development (DFID), via its East Africa Research Fund (EARF), identified Kenya's ASM sector as one of three East African country case studies. Building upon existing research and informed by two field studies, the Kenya case study seeks to profile the current contributions of ASM in the country; identify specific barriers and opportunities for improved sectoral performance and outline key recommendations for pro-poor development and broad-based economic growth.

Methodology

In addition to a national overview of the country context, its ASM sector and prevailing policy and legal frameworks, two case study commodities and regions were targeted for more intensive study. The selection process involved two steps: first the minerals for study were chosen based on a range of economic, social and environment criteria and relevance to DFID programming; second, representative sites were selected for the size and types of operations and research accessibility. From these criteria, Migori was selected as the case study area focused on gold and Taita Taveta County on gemstones. Field assessments were conducted at these two sites that reflect the diversity of Kenya's ASM sector and provide insight into the economic contribution of ASM. Assessment of case study sites was done qualitatively and semi-quantitatively through literature review, site visits, interviews with key informants and the appraisal of economic performance of operators, supplemented by a quantitative household survey.

Key Findings

Key findings are summarised as follows:

- **Overall, the gold mining sector, considering other counties such as Siaya, Turkana etc. as well as seasonality of work, likely provides work for some 40,000 Kenyan citizens, whilst the gemstone sector countrywide might employ some 30,000 miners.** This confirms the importance of the ASM sector, providing employment for approximately 140,000 ASM miners. Using the 2009 population and household census, which gave an average of 6 persons per

household, the number of dependants can be estimated by multiplying the number of miners by 6. **This results in more than 800,000 Kenyan citizens that are dependent on ASM.**

Key findings in Migori case study are summarised as follows:

- **In Migori, mining is, by far, the main income-generating activity.** The quantitative household survey results showed that although agriculture is often practiced alongside mining in the communities surrounding Osiri, mining is, by far, the main income-generating activity in the area and 78% of miners surveyed did not wish to abandon their jobs in the mines.
- Men constitute 92% of the extraction workforce, in which approximately 400 workers are employed at the Osiri site. Women constitute 62% of the mineral processing (crushing, milling, sluicing, amalgamation) workforce. Many women miners consulted expressed that the ability to pay school fees was one of the most important benefits of their work in ASM.
- Child labour does exist but to a lesser degree than the authors anticipated - it appears to be most pronounced in the most informal sites.
- **The most significant environmental and OHS issues in the Migori gold mines were the extensive misuse of mercury in the production process.** The environmental and health risks associated with mercury misuse are significant. Other substantial environmental concerns relate to deforestation.
- Traders operate in informality. Once gold is produced, it is sold to local traders who continue to operate informally in all gold producing villages.
- As legal export of informally traded gold is not possible, ASGM is exported informally, mainly to Uganda and then re-exported onwards to United Arab Emirates (UAE). The selling price in Kampala, the regional gold hub, is 98-99% of the London Bullion Marketing Association (LBMA) price. The Kenyan seller who exported the gold informally from Kenya, could, potentially repatriate up to this amount in Kenya.
- Whilst these exports may be informal, foreign currency through the gold sales abroad can flow into the Kenyan economy and contribute to its strengthening. Under this scenario, up to 99% of the value of the gold can return to Kenya and be injected into the economy.
- Based on the household survey conducted as part of the field research, **around 50% of the value of the gold goes to those working in ore extraction, processing and mineral trading directly**, thereby contributing to the local economy.
- **Women in the ASM workforce yield only 11% of the revenue share** despite comprising 38% of the workforce.
- Direct taxes are not levied, however, **indirect taxes through workers or owner spending (VAT) or fuel consumption significantly contributes to the Kenyan budget.**

Key findings in Taita Taveta case study are summarised as follows:

- **Taita Taveta County, one of the country's main gemstone producing areas**, is located within a gemstone belt that spans Kenya and Tanzania and produces high and middle value gemstones including green and red garnets, ruby, blue and pink sapphire, green and yellow tourmaline, rhodolites and kyanites. The area is expansive, covering 17,084 km², **although only 12% is arable and 62% is covered by two national parks.**
- **In the most gemstone reliant sub-counties, Mwatate and Voi, ASM provides the main source of employment.** Both men and women find it easy to get engaged in mining and that someone employed in a mining activity earns more money than an agriculture worker.
- **The number of miners in the extractive and processing sector in Taita Taveta is approximately 10,000, with women comprising only 15% of the ASM workforce.** Although youth are abundant at mine sites, the engagement of young children in mine work appears to be limited, however hundreds of vulnerable young men (15 to 24 years old) seem to dominate work at many sites.
- **The national market value of the production for 10,000 miners amounts up to KES 12 billion (USD 120 million).**
- **Miners' income spent in VAT-taxed goods in Taita Taveta contributes an estimated USD 1.6 million** to the annual Kenyan national budget, which by far exceeds the total royalty revenues.
- **The main environmental and health risks associated with ASM relate to poor conditions at mine camps and within the mine operation areas.** The nature and severity of environmental and occupational risks in Taita Taveta's mines is closely tied to water scarcity.

Recommendations

Shifts in political will and current legal reform processes create an important opportunity to realise the development potential of the ASM sector and to address related risks. Key recommendations from this work are summarised as follows:

Formalisation Should Be Advanced

- **Promote formalisation process in the ASM of gold and gemstones supply chain.** Formalisation of ASM of gold and gemstones production and trade will bring greater transparency and accountability in the supply chain. For this suggestion to be implemented successfully, it is important that there is coordination between several support institutions, particularly government agencies. To better achieve a continuous, coherent and integrated process of formalisation, it is recommended that the government develop a plan and programme of formalisation, and engage ASM stakeholders in its design and development.
- **Formalisation strategies must be integrated with legalisation strategies.** Legalisation activities are only one dimension of formalisation. Considerations include capacity building of ASM operations on key topics, creation of economic incentives for formalisation, creation of targeted policies and programmes to empower the most vulnerable groups and rectify gender inequalities, and mechanisms to support gender-inclusive organisation of miners in legal entities, among others.
- **Establish systems for evidence-based decision making and robust monitoring and evaluation of progress towards formalisation.** This will require formal coordination between multiple actors, in particularly among government agencies. The first step is to jointly develop and implement an ASM census.
- Most of the proposed recommendations related to the legal framework are part of the on-going development of the mining regulations, without implying or requiring a change to the Mining Act.

Regarding the classification of ASM operations, the following main adjustments are proposed:

- **The AM permit needs a criterion** that is objective and measurable.
- **The technology limitations should be carefully evaluated** based on the consequences of the barriers regarding the use of cyanide, mercury and explosives.

Regarding the types and characteristics of the ASM permits, the following adjustments are proposed:

- **One permit for small-scale operations.** Reconnaissance and prospecting rights that currently are granted by different small-scale permits should be given as part of the SSM permit, but only in the cases where Kenyans are the absolute owners of the corporate body.
- **Relations between mining operator(s) and (artisanal and small-scale) mining permit holder(s) need to be clearly regulated** and defined particularly in the case where the titleholder is a natural person.
- **There needs to be definition of designated and non-designated areas** to better understand the concept of the permit area. The relation between ASM designated areas and mining permits should be clarified.
- **Consideration should be given to extending the size of the area** of SSM permit to promote viability and stability of the small-scale mining operations.
- **Consider allowing successive permit renewals** for AM permit and SSM permit for continuation of mining operations until the mineral resources have been exhausted.

Regarding the requirement of the permits, the following adjustments are proposed:

- **Different legal requirements for different size ASM operations.** Ensure that the Mining Act's approach towards the different requirements for obtaining the ASM permits is reflected in the mining regulations.
- **The legal treatment of corporate bodies that are candidates for small-scale permits needs to be clarified in terms of the requirements for permit attribution**, specifically regarding the distinctions between those that are only comprised of Kenyan shareholders or partners and those that are not.
- **Consider clarifying the exclusivity right to operate in the mining area**, in the prospecting permit, SSM permit and AM permit.
- **Consider clarifying the rights of transfer and upgrade** for a prospecting permit, SSM permit and AM permit.

- **Royalty rates need to be in balance with economic incentives for formalisation and harmonisation in neighbouring countries.** Lower the royalty rate to attract ASM of gold and gemstones into the formal sector. Alternative best practice option: exempt ASM from royalty payments.

Targeted Trainings Needed for Diversity of ASM Stakeholders

- **Production can be substantially increased through the introduction of and training** in a range of issues, including, basic mine planning, extraction methods, processing optimization, gemstone handling and valuation.
- **Specific training is needed in a range of critical environmental, health and safety topics**, from mercury use, underground risk identification and timbering, to mining methods (rock breaking, hoisting systems) and occupational health and safety systems (e.g., communication, incident management), and improved processing and downstream methods, ideally coupled with mechanisms for financing basic improvements and more advanced technical support.
- **Prioritise women's participation and training**, including within formalisation efforts in order to address inequalities at ASM sites. This training could include sensitisation and training programmes and the establishment of basic, simple organisational policies, codes of conduct and rules (environmental, occupational and labour related), with gender mainstreamed throughout.
- **Potentially negative gender implications of new technologies and methods must be predicted and mitigated.** A gender impact analysis of proposed technical interventions and targeted, preferential training of women in any new methods must be coupled with efforts to counter discriminatory beliefs and challenge barriers to women's access to different jobs.
- **Disseminate emerging best practices on a range of social and economic approaches, including financing models**, efforts to tackle gender inequalities, and youth vulnerability, as well as child labour.

Specific Recommendations for Gemstone Sector

- **Establish a free trade zone market for gemstones.** Gemstones are the easiest commodity to smuggle. In order to formalise the trading and exporting of gemstones, tax incentives must be in place.
- **Establish a strong gemstone cutting industry.** To add value locally to gemstones, cutting must take place in the country. To do so, capacity-building programmes with international technical support should be put in place. Incentives for women can be also introduced, as men or women can equally perform cutting.
- **Establish a gemstone centre** where international buyers could buy or where miners or miners' organisations could consult various buyers at the same time, which could even perform as a centralised cutting centre.

1. Introduction

1.1. Context

The establishment of a new Ministry of Mining (MOM) in 2013 and the enactment of a new mining act in 2016 has led Kenya's mining sector to undergo a complete overhaul. The 2010 Constitution officially recognised the role of artisanal and small-scale miners. The government is making concerted efforts to eliminate historical poor practices associated with the sector and create policy stability and a conducive business environment to attract foreign investment. However, the economic role of artisanal and small-scale mining (ASM) in Kenya is still under-researched¹ and poorly understood by many national and international decision-makers. Available evidence is largely anecdotal and patchy, leading to speculation about the actual potential of the sector. Robust evidence is lacking to understand the current economic contribution of ASM in Kenya, how the sector is formally or informally coordinated, how many and which demographic groups are trapped in the poverty cycle, and who is benefitting from the sector in its current form².

1.2. Purpose of this Study

It is against this backdrop that the U.K. Department for International Development (DFID), via its East Africa Research Fund (EARF), identified Kenya's ASM sector as one of three East African case studies to assess the current and potential economic contributions of ASM at national and sub-national levels. Building on existing research and informed by two field studies, the Kenya case study seeks to profile the current contributions of ASM in Kenya, identify specific barriers and opportunities for improved sectoral performance, and outline key recommendations for pro-poor development and broad-based economic growth.

Together with parallel case study reports in Uganda and Rwanda, this work will inform a global analysis on the 'Impact of Small-Scale Mining Operations on Economies and Livelihoods in Low to Middle Income Countries', thereby providing an invaluable contribution to the ASM discourse and a clear direction for increasing ASM's contribution to economic growth, inclusive development, and good governance of the sector.

1.3. Methodology

The Kenya case study profiles the current contributions of ASM mining in the country and employs several methods, tools, and approaches, including stakeholder engagement, gender analysis, child protection policy, supply chain analysis, community and research uptake strategy, and selection of research areas and minerals. The methodology to develop this study builds on existing research and is informed by two field studies: Osiri gold mine in Migori County and gemstones in Taita Taveta County, particularly tsavorite.

1.3.1 Limitations

Given that this study design did not allow for a comprehensive, countrywide ASM analysis or a supply chain analysis for all commodities, the researchers, in consultation with DFID, chose the two representative supply chains (each starting from one upstream ASM producer community). Based on that decision, and in consultation with DFID, the two minerals were selected using diverse criteria, including their economic contribution expressed in existing sales and export value, employment generation, potential negative externalities relevant to social development as well as long-term resilience, readily available data, and relevance to DFID programming.

The two research areas and mines also were identified based on criteria that allowed comparative and commonalities analyses, including the type of organisation, number of miners, production, presence of

¹ Hilson & McQuilken 2014: '...despite its growing economic importance, ASM occupies a peripheral position on the economic development agenda of sub-Saharan Africa'.

² Terms of Reference, Economic Contributions of Artisanal and Small-Scale Mining in East Africa, DFID East Africa Research Fund.

women, and level of mechanisation. Other important criteria were acceptance by the representatives of the mines to receive the project team and share information, along with the manageability of geography within a time-constrained study.

The country case study makes no claim of reflecting a comprehensive country-wide ASM sector analysis, nor supply chain analysis for all commodities, and, in the case of gold and gems, cannot claim to characterise conditions beyond the Migori and Taita Taveta Counties study. Nevertheless, reasonable efforts were made to account for the variable strength and quality of evidence.

Primary data collection for the country case study was assessed for the two mining areas. These assessments provided an overview of qualitative and semi-quantitative information obtained through interviews with key stakeholders and the appraisal of the economic, technical, and environmental performance of the operations. Where possible and to fill existing gaps, primary data collected at the study sites were complemented with official and previously published data. All primary data and information gathered were triangulated with different sources when possible, then checked for consistency alongside observations made during the field studies.

When official data was not available, for example for the gold market where all international trade is informal or for the gems where only a minor part is being officially accounted for, data was estimated through field interviews, literature reviews, and field analysis and cross-checked for consistency. Kenya has very limited official statistics for ASM. For gold, no recent export statistics were available and for gems only official exports reports were available for consultation. No information was made available on production level or number of miners.

The quantification of the national ASM of gold and gemstones sectors was performed by extrapolating the field analysis results whilst cross-checking its consistency with the literature reviews and interviews. By definition, any extrapolation bears the fact that it approximates the reality rather than being 100% correct. Nevertheless, these extrapolations are valuable because they give the general magnitude of the economic impact of ASM nationally.

This study was supplemented by a quantitative household survey for each field study, results of which are threaded throughout the findings. The survey design is described in Annex 4, and results presented are representative of populations within and immediately surrounding the mines studied.

2. The ASM Context in Kenya

2.1. Country Overview and Context

Figure 1: Kenya Location Map



Kenya is located on the eastern coast of Africa and covers a total surface area of about 586,600 km² and has 480 km of coastline on the Indian Ocean. It is bordered by Somalia to the east, Ethiopia and South Sudan to the north, Uganda to the west, and Tanzania to the south.

2.1.1. Population

Kenya's current population is calculated at 46.8 million people, with 3–4 million living in the capital city Nairobi. Mombasa is Kenya's second largest city with a population of 1–2 million.

2.1.2. Political Context

Kenya gained independence in 1963 and is constituted as a presidential republic. A new constitution was adopted in 2010, putting 'devolution'³ at the core of a new political and economic governance system. Devolution is believed to have strengthened accountability and public service delivery at local levels. The Government of Kenya (GOK)'s agenda is to deepen implementation of devolution and strengthen governance institutions whilst addressing other challenges, including land reforms and security to improve economic and social outcomes, accelerate growth and equity in distribution of resources, and reduce extreme poverty and youth employment⁴.

2.1.3. The Economy

With a gross national income (GNI) of USD 1,340 per capita in 2015, Kenya is a lower-middle income country. The World Bank's most recent Kenya Economic Update 2016⁵ projected a 5.9% growth in 2016, rising to 6% in 2017. The report attributed the positive outlook to low oil prices, good agriculture performance, supportive monetary policy, a stable macro-economic environment with contained inflation, and ongoing infrastructure investments. Mining and quarrying, accommodation and food services, electricity and water supply, and information and communication sectors recorded improvements, whilst manufacturing, construction, financial, and insurance sectors slowed⁶.

2.1.4. Informal Sector

The recent World Bank report on informal enterprises in Kenya reveals that as of 2014, according to the Kenya National Bureau of Statistics (KNBS), **the informal sector represents 83% of employment**. According to the 2015 Economic Survey, the total number of persons enrolled in both formal and informal sectors increased from 13.5 million in 2013 to 14.3 million in 2014, and of the 799,700 new jobs, 700,000 were created by the informal sector. A majority of informal businesses (87%) use their own funds to finance the day-to-day operations, with only 9% using banks. The main problems informal businesses face is access to finance (59% of firms surveyed), followed by electricity problems (10%), access to land (9%), and corruption (9%)⁷. Although this report draws information from other non-farming economic sectors than mining, the national context of prevailing informality also applies to the ASM sector.

2.1.5. Human Development

With a Human Development Index (HDI) of 0.548 in 2014, Kenya ranks 145 out of 188 countries⁸. Kenya has met a few of the Millennium Development Goals targets. Reduced child mortality, near universal primary school enrolment, and narrower gender gaps in education were achieved through devolution and increased spending on health and education⁹.

³ 'Devolution is a form of decentralization where political, administrative and fiscal authority is transferred from the national level to independent sub-national constitutional or statutory agencies. Kenya's devolution model involves the National Government transferring powers, functions and responsibilities by legal and constitutional provisions to independent popularly elected county governments. By this, the Constitution gives full responsibility and public accountability for certain functions to the counties.' Kenya 2015

⁴ World Bank 2016b, CIA 2016

⁵ World Bank 2016c

⁶ World Bank 2016b

⁷ World Bank 2016a

⁸ UNDP 2016

⁹ World Bank 2016b

The **Kenya Vision 2030** (hereafter, Vision) is the national long-term development policy that aims to transform Kenya into a newly industrialising, middle-income country, providing a high quality of life to all its citizens in a clean and secure environment by 2030. The Vision is composed of three key pillars.

- The **economic pillar** aims to achieve an average economic growth rate of 10% per year and sustaining the same until 2030.
- The **social pillar** seeks to engender just, cohesive, and equitable social development in a clean and secure environment by investing in the people to improve their quality of life by targeting human and social welfare projects focusing on education and training, health, environment, housing and urbanisation, gender, children, and social development.
- The Political Pillar aims to realise an issue-based, people-centred, result-oriented, and accountable democratic system¹⁰.

The GOK created a Vision Delivery Secretariat (VDS), which provides leadership and direction to realise Vision goals and has the capacity to oversee the implementation of all Vision projects as a semi-autonomous government agency¹¹.

2.2. The Minerals Sector

2.2.1. Sector Overview

A wide range of minerals, both metallic and industrial, occurs in the country. The geological environments for the mineralisation can be summarised as follows:

- The Archean Nyanzian Craton area of western Kenya, where metallic mineralisation of base and precious metals such as gold, copper, and silver are present and the potential for ferrous and non-ferrous metals exists
- The Proterozoic Mozambique Belt that runs through the centre of Kenya from north to south, in which minerals such as kyanite, corundum, graphite, wollastonite, marble, asbestos, fluor spar, magnesite, kaolin, and a variety of gemstones are found
- The widespread sedimentary rocks of Palaeozoic to Quaternary: These rocks are sources and hosts of limestone, gypsum, clays, manganese and construction materials, and hydrocarbons (discovery of oil in Turkana County in 2012). Base metal mineralisation, lead-zinc-barite, and copper are known to occur in the sedimentary basin along the coastal belt. Heavy mineral sands containing titanium are found in coastal beach sands
- The volcanic rocks associated with Rift System, which host a variety of minerals and construction materials such as clays, evaporites, trona (soda ash), diatomite, gypsum, and gem-quality rubies: Carbonatites known for potential of niobium and rare earth elements (REE) are found in the Nyanzian shield area, around Lake Victoria shores, and in the southern part of the coastal sedimentary basin¹².

Kenya aims to increase the mining sector's contribution to the gross domestic product (GDP). In 2015, the share was 0.8% and the government targets 10% by 2030 through value addition, the implementation of a recently approved Mining and Minerals Policy that outlines a 20-year mining strategy, and a new Mining Act¹³.

Although large-scale mining (LSM) companies have operations in the country, ASM remains a significant activity. LSM currently employs around 9,000 workers in Kenya¹⁴. Although no official data is available, the ASM population was estimated to be 146,000 people in 2012¹⁵. The sector remains largely informal, yet produces approximately 60% of the country's gemstones, most of its gold, quarrying of stones, and other construction materials¹⁶. Total gold production is reported at approximately 3.6 tonnes for 2013 (Figure 3), but independent experts estimate artisanal and small-scale gold mining (ASGM) production alone at about 5 metric tonnes per year^{17,18}.

¹⁰ Kenya n.d.

¹¹ For further information consult <http://www.vision2030.go.ke>

¹² NN n.d., Pohl & Horkel 1980, Horkel et al. 1984

¹³ Senelwa 2016, Igunza 2016

¹⁴ Yager 2015

¹⁵ Seccatore et al. 2014

¹⁶ Rop 2014, Yager 2015

¹⁷ Seccatore et al. 2014

Figure 2: Geology and minerals endowment of Kenya¹⁹

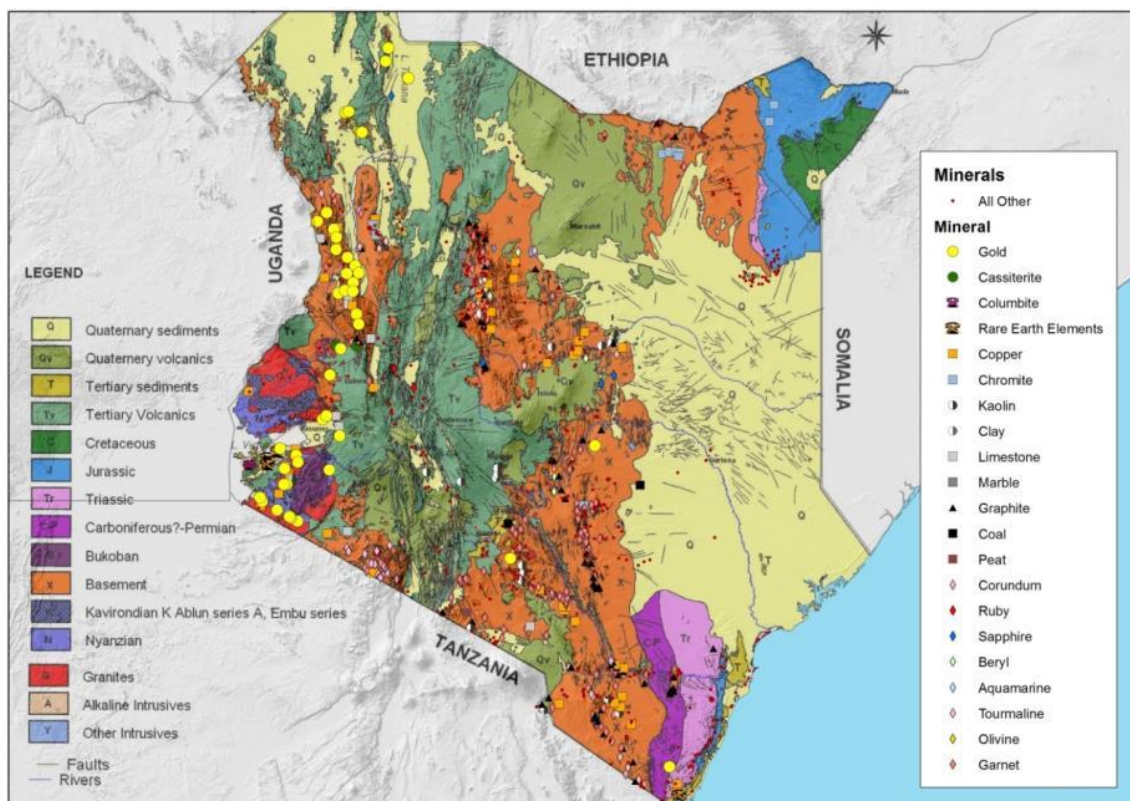
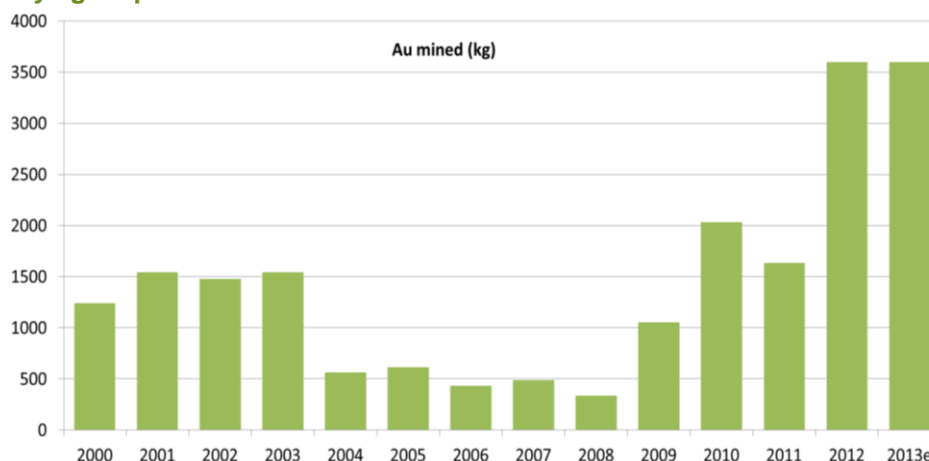


Figure 3: Kenya gold production²⁰



2.2.2. Mining Sector Stakeholders

Multiple stakeholders have key roles to play in supporting development of Kenya’s mining sector, ranging from LSM operations, the country’s vast ASM sector, traders, exporters, government regulators, and development authorities to international organisations that have existing or planned

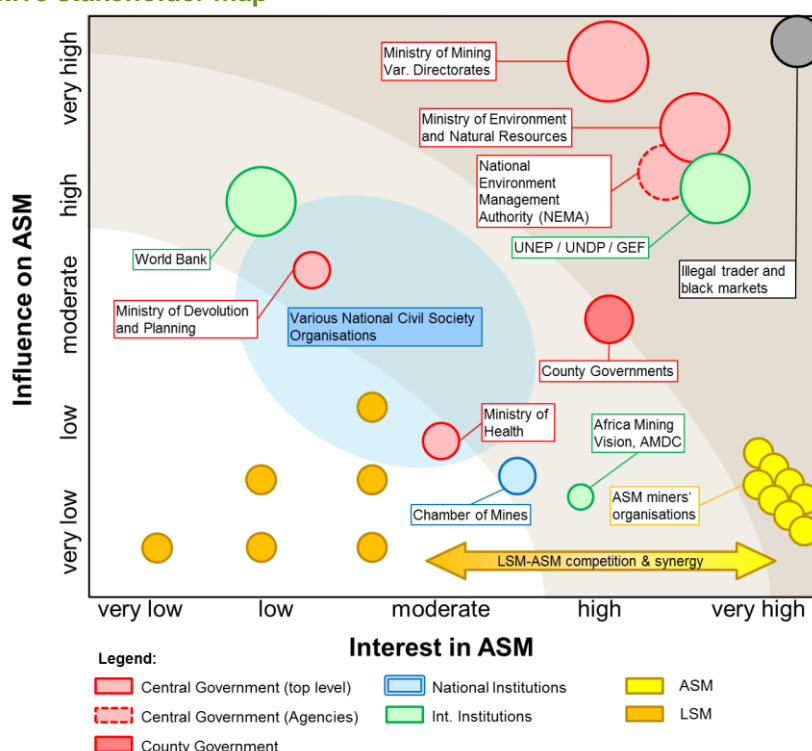
¹⁸ For ASM products such as gold (and probably gemstones), only a fraction of cross-border sales are registered as official exports and hence in trade statistics. Blore (2015) clearly demonstrates this reality for the case of gold exports from the ICGLR region.

¹⁹ Map produced by project, based on data provided by the MOM.

²⁰ Data source: George 2015 and previous volumes of the USGS Minerals Yearbook.

programmes in the sector. Figure 4, the stakeholder map, highlights main actors, indicating their perceived level of interest and influence in sustainable ASM in Kenya. A detailed description is provided in Annex 2.

Figure 4: Indicative stakeholder map



2.2.3. Legal Framework for ASM

Kenya recently passed its long-awaited Mining Act (12/2016)²¹ and new mining regulations that are in an advanced phase of drafting and public consultation. The Mining Act and the draft mining regulations lay out the new legal framework for the mining sector in the country, including the ASM sector. However, depending on the extent and scope of the new regulations, other laws and regulations may need to be promulgated to fully develop and refine this framework. Kenya signed the Minamata Convention on Mercury on 8 June 2015. Ratification is pending.

It is too early to assess the impact of the Mining Act of 2016 in terms of the legalisation and formalisation²² of the ASM sector, but during the fieldwork interviews the general perception was that the Mining Act is a step forward from the previous Mining Act Cap 306 (1940) regarding the official recognition of ASM as part of the mining sector in Kenya. This recognition of ASM is an important first step for the success of any process of legalisation of the sector.

The mining law must have specific features to successfully promote the legalisation of ASM. Lessons learned from other countries show that the legal framework needs to recognise²³:

- **The unique technical, financial, economic, and social aspects of the ASM sector in the country.** It would be an overly simplistic approach to the complex realities of the mining sector to suggest that there is only one way to conceive of (and perform) mining activities. Large- and medium-scale mining should not be considered to be the ultimate model for this complex and

²¹ Kenya 2016

²² 'Formalization is a process that seeks to integrate ASM into the formal economy. The process of formalization includes the development or adaptation of mining (and other) laws or policies to address the challenges of ASM. A well-designed formalization process generates the enabling conditions for accountability within the sector so that it can ultimately be integrated into the formal economy. Formalization can only be successfully achieved if programmes and public policy deal with the different dimensions of ASM activities simultaneously and in an integrated way. Legalization is just one dimension of the process of formalization'. UNEP 2012

²³ SDC 2011; UNECA 2002; Barreto 2011

diverse sector. Understanding the particular aspects of ASM is crucial for the success of any legalisation process. These financial, economic, and social aspects will likely change over time, with gradual formalisation and the development of the ASM sector. The law should not only adapt to, but promote and support these developments.

- **ASM sub-sectors constitute the diverse spectrum of the ASM sector in the country.** ASM is a diverse sector (in size, type of operation, target minerals, etc.) and it is impossible to promote the legalisation of the different sub-sectors without having the legal framework take consideration of the different stages of development of various types and sizes of ASM operations.
- **ASM sector as an economic sector. Regardless of the size of the operations and the different economic actors in the supply chain, there is an economic and profit rationale to decision-making.** This fact has important consequences in terms of the role of the legal framework in balancing the different economic relations between the actors, but also in the choice of the kinds of instruments to use to regulate the sector.

Based on these lessons, the assessment of the mines visited, and the interviews with different actors and stakeholders, an analysis of the above cited Mining Act 2016 is presented in this report with a focus on the ASM mineral rights characteristics and requirements for their implementation. This analysis does not cover the full ASM legal framework, but it is essential because the mineral rights determine what type of operation will be developed and the requirements for granting and maintaining the licences ultimately define the feasibility of these operations and their capacity to be legalised.

It is important to highlight that the tables below are an interpretation of the Mining Act 2016 from the perspective of the authors of this report. This is relevant because there are small but important areas in the Act that lack clarity and have gaps and/or contradictions.

Classification of ASM Operations

It is important to have a clear definition of a mining operation that is artisanal, small-scale, or large-scale because definitions allow for a clear distinction between the different legal mining regimes. Each regime attributes different rights and obligations that depend on the size of the operation and other associated characteristics.

Also, this distinction has practical importance: for the mineral right applicant to be able to choose the correct regime, the government authority to evaluate (based on the criteria defined) whether the application is compatible with the mineral right request, and to determine whether an operation is compliant with its mineral right. These are important steps for both the government and candidate/holder of the title.

The Mining Act 2016 defines four permits for the ASM sector. Table 1 identifies the criteria that determine the scale of the operation for each permit. The Mining Act 2016 defines an investment criterion for small-scale operations, but the amount of the investment still needs to be defined by the regulation.

Table 1: Classification of ASM operations²⁴

Type of operations	Estimated annual extraction of minerals or material bearing minerals	Investment/expenditure	Technology
Artisanal mining (AM) operation	Not defined	No	Traditional and customary mining operations using traditional or customary ways and means
Small-scale reconnaissance operation	Not applicable	Not defined	Not defined
Small-scale prospecting operation	Not applicable	To be defined in the regulation	Does not employ specialised prospecting
Small-scale mining (SM) operation	Not exceeding 25,000 m ³ per year	To be defined in regulations	Does not use mechanised mining technologies, or chemicals including mercury

²⁴ Republic of Kenya. The Mining Act (2016)

Type of operations	Estimated annual extraction of minerals or material bearing minerals	Investment/expenditure	Technology
			and cyanide or explosives

Another criterion for ASM operations is technology, which prohibits the use of mechanised equipment, or explosives, mercury, or cyanide. Basically, **the Act does not allow any improvements in the techniques and methods through mechanisation**. One consequence of preventing the use of mechanisation is that when the artisanal or small-scale operator has the financial conditions to introduce some mechanisation, which could have an impact on profitability, working conditions, and/or environmental conditions, the law restricts these developments. It is understandable that the Act's objective is to prevent LSM from being camouflaged under a SSM permit, but the criterion of the annual extraction of minerals or material bearing minerals defined in the Mining Act is enough to prevent that from happening.

There are several limitations to the classification of ASM operations worth noting.

- **Artisanal operation:** The main problem is that the only criterion is the use of technology. The lack of specificity in the type of technology makes it difficult to classify or distinguish an AM operation from other mining operations.
- **Small-scale operations for reconnaissance:** The Act does not define any criteria. The only potentially objective criterion in this permit is the investment (which has yet to be identified and defined). Contrary to the small-scale operations for prospecting and mining, the Mining Act does not define investment as a criterion.
- **Small-scale operations for prospecting:** The Act defines investment as one of the objective criterion, but the specific amount is yet to be determined by regulations. Additionally, the Act states that small-scale operations cannot employ specialised prospecting. This is a criterion that is not objective and is difficult to evaluate.
- **Small-scale operations for mining:** The 'estimation of annual extraction of minerals or material bearing minerals' is an objective and precise criterion because it is easy to evaluate by specialists and indirectly restricts the technology and investments without needing to introduce other criteria. However, the language needs further precision because the annual extraction of the minerals is different than the annual extraction of material bearing minerals; these are two different concepts with different implications in terms of volume. Another issue is that extraction of material-bearing minerals from alluvial deposits should be measured in m³ and for hard rock in tonnes. The other, more substantial problem with this criterion is the amount: 25,000 m³ is relatively low for a small-scale operation because it means a limit of 68 m³ per day (assuming 365 days per year) of material bearing minerals per mine. This limit is of concern when considering that the next licence available to miners is an LSM licence that has a set of very demanding and costly requirements for granting and maintaining the licence, which small-scale operations cannot meet or afford. Another issue related with classification of these operations is that the restrictions of use of explosives, cyanide, or mercury will impose severe limitations in the extraction and processing of the ore. The only way to overcome these legal restrictions in the case of mercury and cyanide is to sub-contract the processing of the extracted material or sell the ore to medium or large processing plants. The mines visited by the research team used mercury. This use can be improved to prevent health and environmental impacts using techniques and methods that are simple and low cost, such as retorting. In the case of the cyanide, the current practice is not to process the ore coming from mercury amalgamation at the mining site, but rather in small-scale processing plants outside of the mining area that may or may not have the same owners as the mining operations. **These processors will be important agents for formalisation of the ASM sector and for environmental improvement programming.** The restrictions of the use of explosives results in an important limitation for both gemstone and gold operations that will either promote illegal use or will result in the operations not being able to be legalised.
- **Differentiation between AM and SSM operations:** The Mining Act 2016 recognises two segments or sub-sectors of ASM: AM and SM. However, the actual difference between these two types of mining is unclear in terms of the size of the operations and because both have similar vague restrictions regarding technology.

ASM Mineral Rights

There is one permit for AM operations and three permits for SSM operations. Reconnaissance is an optional permit, which means that SSM operations can directly apply for a prospecting permit. The Act defines that prospecting activities should occur before the attribution of the SSM permit.

Artisanal and small-scale operations perform prospecting activities that are a combination of reconnaissance and prospecting, but the characteristics of these activities are different from LSM. It is not a separate phase in the mining cycle, which has a one or two-year duration, but rather they tend to be activities where the time frame is measured in months and are ongoing alongside of extraction activities. The techniques and methods employed are simple and based on traditional knowledge. The main reason for these differences is the lack of available capital to introduce sophisticated and modern techniques for locating and determining the quantity and quality of the mineral deposit. In the case of alluvial deposits, the physical characteristics of the deposits also play an important role in the reasons for adopting this kind of approach to exploration activities.

The Act does not allow the (small-scale) prospecting permit to use sophisticated techniques. However, it uses the logic of a large-scale permit in the sense of anticipating long periods of time and defining phases before extraction activities, which would only be justified if detailed exploration work with sophisticated technology were performed. International best practice²⁵ recommends that the SSM permit grant both prospecting and extraction rights and they be consolidated into one licence. However, this solution is only suggested when Kenyans wholly own the corporate body.

Characteristics of the ASM Permits

Table A2 in Annex 3 identifies the main characteristics of the ASM permits. These characteristics are important because they define the quality of the ASM mineral permits through rights attribution related to size of the area, duration, and renewal of the permit and of exclusivity, transfer, and upgrade rights.

These rights have implications for ASM operations in terms of feasibility, access to financial resources, stability, and the possibility to improve the economic, technical, and social conditions of the mines. In addition, **these rights represent the benefits of legalisation. If the rights granted by the permits are weak vis-a-vis the obligations imposed, the mining operations may not have sufficient economic conditions and incentives to become legalised.**

Eligibility for ASM mineral rights

A Kenyan individual and corporate body can apply for AM and SSM permits. The diversity of legal umbrellas for ASM operations is important because it enables various economic arrangements to be legally adopted. In the case of small-scale permits, the corporate body can be wholly owned by Kenyans or not (in this case, no less than 60% of the shareholding should be held by citizens of Kenya)²⁶. Annex 3 elaborates on potential risks, such as that the introduction of foreign capital in ASM might require the regulatory framework to become more restrictive and the eligibility of natural persons might promote an economic model in which the holder of the mineral right is not actually performing the mining activities. This disconnection between holder and operator can generate problems in terms of responsibility for the operation with potential negative consequences in terms of working conditions, occupational safety, and environmental and social impacts.

ASM permit area

The Mining Act defines two categories of areas for AM and SSM mining permits: designated and non-designated areas. Concepts of designated (reserve, dedicated zone, etc.) have become common in different jurisdictions. Annex 3 elaborates on the complexity of this attractive and apparently easy solution to regulate the ASM sector; it either represents a huge investment by the GOK to develop geological surveys for the ASM sector or it serves for the recognition of areas with existing ASM activities. Annex 3 also comments on the size of permits, which seem very small particularly for SSM permits in non-designated areas (approximately 40 ha). **This might create problems for the**

²⁵ UNEP. 2012

²⁶ Experience has shown that when the law forces one specific legal body (e.g., cooperatives) often the economic actors create them on paper to meet the law, but in practice they just maintain those economic relations that are viable between the different economic actors in a particular situation. Bitencourt 2009, Macedo 2015

feasibility and economic stability of the mining operations over time, promoting continued mobility, which is exactly what the ASM sector has been criticised for.

Duration and renewal

An AM permit has a duration of three years maximum and may only be renewed once for the same period. The reason for this limitation on number of allowable renewals is unclear. If the area still has mineral reserves, it would seem to make more economic sense to allow the continuation of the operation until the deposit has been fully exploited. In the case of an SSM mining permit, the duration is up to five years and with a renewal for a maximum of five years. It is unclear whether it can be renewed more than once. **The importance of allowing successive renewals is based on the premise of good management of mineral resources and security of the investment.**

Exclusivity

The Act recognises exclusivity in the case of an SSM permit, but it is unclear whether this applies to prospecting and SSM permits. However, the Act does state that the AM permit cannot be granted in areas in which mineral rights have been granted (this rule applies to all licences and permits except for a reconnaissance licence and permit). Recognising this right of exclusivity for ASM mineral rights has become a trend in the recent ASM legislation. Non-exclusivity rights for a reconnaissance licence or permit is also an accepted practice in the international legal frameworks, including for LSM licences²⁷.

Transfer

Under general provisions, the Act recognises the right of the holder of mineral rights to assign, transfer and mortgage the rights with authorisation of the Cabinet Secretary, on recommendation of the Mineral Rights Board. However, it is unclear whether this generic right applies for the AM permit, prospecting permit and SSM permit. In the case of the reconnaissance permit it does not apply.

Upgrade

The Act recognises this right in the case of an AM permit but it is unclear for the other permits. If the objective of the Act is to promote the improvement of the ASM mining operations, this right should be considered for all permits and licences.

Requirements for permits attribution

The Act is clear about the different requirements for obtaining the ASM permits. It is a simple process and is progressive (as more rights are attributed there are more obligations). This approach follows the current trend in ASM legal frameworks worldwide²⁸. Several small topics in the Act that deserve further clarification and improvements are outlined in section 5.2. These issues can be clarified in the mining regulations that still are in the advanced draft phase. Perceived ambiguities of the Act are discussed in Annex 3.

Royalties

Royalty rates are not included in the new Mining Act, but new rates have been proposed as part of the draft mining regulations. The most relevant rates for the ASM sector are:

- Construction and industrial minerals: 2%
- Precious stones (diamond, emerald, ruby, sapphire and tsavorite): 8%
- Precious metals: 8%
- Semi-precious stones: 5% (except for green garnet, which is 8%)

These rates represent a substantial increase compared to the previous rates. Furthermore, these rates are higher than the current rates for gold or gemstones in neighbouring countries. **This differential may constitute a problem because of the potential for smuggling that tends to occur in these**

²⁷ In some countries the concept of 'prospecting' is used rather than the term 'reconnaissance'. Examples of non-exclusivity on reconnaissance or prospecting titles that applies for LSM: Democratic Republic of Congo (prospecting certificate), South Africa (reconnaissance permit), and Namibia (reconnaissance and prospecting licences). In Namibia, these licences can be non-exclusive or exclusive depending on the authority's evaluation and the request by the candidate for these licences.

²⁸ SDC 2011

situations. In Tanzania, for example, gemstones and diamond royalty rates are 5%, gold 4%, and gems (cut and polished) 1%²⁹. The typical rates (which do not necessarily apply to ASM operations) for gold in African countries tend to range 2–5% maximum.³⁰ An alternative approach to calibrating royalty rates is addressed in the section 5.2.

In ASM legal frameworks there is a trend to apply special rates for ASM operations. In the words of the renowned international taxation expert Otto (2006):

On the other end of the spectrum, many countries will exempt small-scale or artisanal miners from paying royalties. In general, the cost of administering and collecting royalty payments on these operations is perceived to be higher than the economic benefits. Even in countries where small mining operations are highly regulated, operators may be given a break on royalty payments. For example, many Canadian provinces charge no mining taxes on operations that record a minimum threshold of income during the tax year.

The new rates in Kenya have not adopted this approach; however, it is unclear whether the royalty applies for AM permit. In contrast to the SSM permit, where it is explicitly mentioned in the Act, it is silent for the AM permit.

3. Case Studies

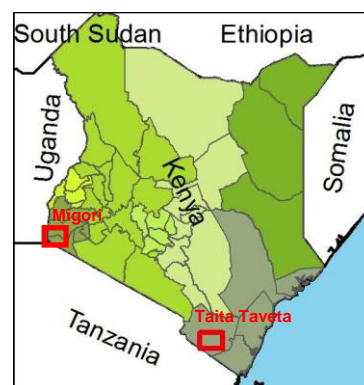
Field assessments were conducted in two sites that reflect the diversity of Kenya's ASM sector and provide insight into the economic contribution of ASM.

Gold accounts for the most value of all minerals extracted by ASM in Kenya³¹. Migori, Siaya, and Turkana counties are the most active ASGM areas. Following consultations with DFID in August 2016, **Migori** was selected as the case study area based on the number of miners active there, export figures, diversity of both participants in the sector and levels of mechanisation, access considerations, and the potential contribution of the study to positively assist emerging market and development programmes in the region.

Approximately 80 tonnes of different types of precious and semi-precious **gemstones** including amethyst, aquamarine, cordierite, green garnet, other garnets, ruby, sapphire, and tourmaline, were extracted in 2013³². Consistent with gemstone mining around the world, the majority of stones are produced by ASM. **Taita Taveta County** was selected as a case study area because of its dominance in production and other factors, including the reported participation of women, promotion of the sector by the local government, and emerging partnerships between different stakeholders, including academic institutions and LSM.

Assessment of case study sites was done qualitatively through a literature review, site visits, interviews with key informants, and appraisal of economic performance of operators³³. These activities were supplemented by a quantitative household survey, results of which are threaded throughout the findings. The survey design is described in Annex 4 and results presented are representative of populations within and immediately surrounding the mines studied.

Figure 5: General location of case study sites



²⁹ Tanzania 2010

³⁰ Gajigo et al. 2012

³¹ In the USGS Minerals Yearbook, which draws from official sources, Kenyan gold production in 2013 is reported by Yager (2015) as 2.1 tonnes and by George (2015) as 3.6 tonnes, while an independent estimation by Seccatore et al. (2014) suggests 5 tonnes of gold from ASM sources.

³² Yager 2015

³³ All statistics presented below are considered to be statistically significant ($p < 0.05$) unless otherwise indicated.

3.1. Case Study: Osiri Gold Mine, Migori County

Located in southwest Kenya bounding the shores of Lake Victoria, Migori County's economy is strongly tied to ASGM. The sector reportedly provides the main source of livelihood for approximately 10,000 residents and takes place at sites in Nyatike, Rongo, Sunna East, Sunna West, Kuria East, and Kuria West Sub-counties. Activities are prone to periodic gold rushes characterised by high mobility, with miners migrating from one mine site to another, depending on the perceived availability of gold.

This section summarises the main findings and conclusions drawn from the Osiri gold mining area in Nyatike Sub-county, one of the most active production sites in Migori. Results were supplemented and validated by assessments in Kopoudho and Kurutiange gold sites.

3.1.1. The Context

Nyatike Sub-county has a current population of approximately 145,000 men, women, and children³⁴, which includes 3,500–5,000 who reside in the semi-temporary town at Osiri³⁵. A large proportion of households (45%) are headed by women, and gender differences in socio-economic status at both household and individual levels are clear (see Figure A28 in Annex 6.).

Figure 6: Gold mining takes place alongside farming and fishing livelihoods



Of the economically active population, approximately 70% of the individuals are engaged in some form of ASM work, whilst only 1% of household heads surveyed indicated that they were not. The household quantitative survey results revealed that although people often engage in agricultural activities, mining in the communities surrounding Osiri is by far the main income-generating activity in the area. Several factors likely work in parallel to influence the economic reliance on mines. **Socio-economic status likely plays a key role in attracting women and men into work the mines**, with clear gender disparities likely playing a role in the distribution of benefits from ASM.

With respect to assets, the survey concluded that less than half of households are likely to own medium- or large-sized livestock (e.g., goats, cattle), with male-headed households showing a slight advantage over those headed by women (49% vs. 40%, respectively). More than 90% of households do not have piped water or gas or electric stoves (indicating reliance on charcoal), and 56% of households lack mobile phones. Of economically active men and women, 56% and 65%, respectively, do not own a means of transport (e.g., bicycle, vehicle) other than walking.

Furthermore, only 22% of economically active individuals are educated beyond primary level, and women are twice as likely as men to have no education (20% vs. 9%), likely limiting many from accessing more lucrative opportunities than ASM (see Figure A54 in Annex 6).

³⁴ KNBS 2010

³⁵ The average household in Osiri 'town' and surrounding areas is composed of 5.45 people, of which 1.2 household members are girls and 1.2 members are boys (under 15 years).

On average, 65% of women and 72% of men surveyed believed that those involved in mining earn more than those in agriculture. Indeed, 78% of **miners surveyed did not wish to abandon their jobs in the mines.**

Within this context, ASM provides an important means for people to improve their lives, particularly when individual incomes and differences between livelihoods are further examined, as observed in the Osiri gold mining area.

3.1.2. Supply Chain Actors, Activities, and Employment

Primary Supply Chain Actors

Six main groups of supply chain actors related to gold production can be distinguished in Osiri: mining committee, mine owners, miners involved in extraction, artisanal mineral processors, traders, and small-scale cyanidation plants.

Mining committee

The Osiri Community Development Committee (OCDC), a registered community-based organisation (CBO), is managed by an elected executive that oversees activities in both the mine and neighbouring community, including allocation of areas (like shops, hotels, etc.), security, and operation of a 160 kVA genset and water pump (costing approximately KES 24.50 or USD 0.25 per day) providing power and water extraction services. The OCDC obtains revenues to operate through payment of one shift of production per month at each shaft³⁶ and collection of rents (approximately KES 25,000–30,000 or USD 250–300 per week) from the shops, hotels, and restaurants at Osiri. The OCDC also administers a nationally registered Savings and Credit Cooperative Society (SACCO) that provides loans to local members.

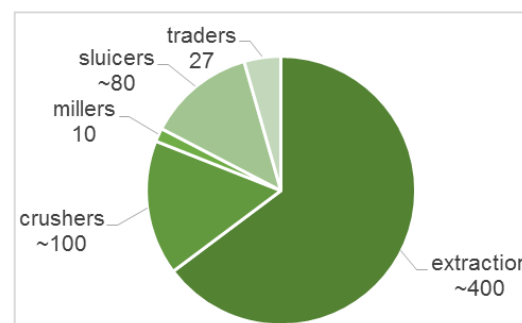
Mine owners

Investment to open a new mine is substantial, in the range of KES 1.2 million (USD 12,000) before reaching the vein and KES 2 million (USD 20,000) for an operational mine. Shaft owners typically bear the costs associated with advancing shafts and tunnels (blasting), its safety (timbering), electric supply, and removal of accumulated water. Investment and operating costs are recovered by applying a 2:1 ratio, wherein, for example, 2 bags of ore for the owners and 1 bag for the miners are recovered. In almost all economic relations between extraction actors, payments are made with bags of ore. Mine owners employ a supervisor to oversee activities, including drilling and blasting, distribution to and recovery of workers' tools used underground, and controlling the numbers of miners working underground, among many other responsibilities.

Extraction workers

Extraction of ore and waste rock is done by workers using underground methods. Miners employed to prepare the mine shaft for extraction of ore are paid by mine owners on the order of KES 300 (approximately KES 7,800 or USD 78 per month) for typically two to three hours of work clearing waste material, whilst jackhammer operators earn KES 1000 or USD 9.50 per hole, blasters earn one bag of ore per blast, and captains overseeing the process earning half a bag per blast. Explosives are provided by the owner. Once the ore vein is reached, the relationship between the owner and the miners converts into a revenue-sharing agreement, usually based on the above-mentioned 2:1 ore-sharing ratio.

Figure 7: Osiri mine provides direct employment for approximately 620 women and men



³⁶ Costs of this contribution are shared between the miners working in shafts (who commit their labour) and shaft owners who pay for related drilling and blasting (approximately KES 30,000 or USD 300 per blast), timbering, supervision, and other operating costs.

Artisanal mineral processors

After extraction, the ore processing is done on site. Different actors along the processing chain interact and are usually paid on a per-bag basis and include:

- **Transporters**, who earn approximately KES 50–200 (USD 0.50–2.00) per bag hauling ore to the processing area
- **Crushers**, who are paid KES 150 (USD 1.40) per bag
- **Millers**, who use locally constructed ball mills (costing KES 300,000 or USD 2,861 per full unit) and are paid KES 300 or USD 2.86 per bag
- **Sluicers**, who conduct sluicing and amalgamation for KES 200 or USD 1.90 per bag (KES 150 or USD 1.43 for sluicing and KES 50 or USD 0.50 for amalgamation)

The sluicing and amalgamation facilities normally belong to an investor who provides the mercury and, in return, receives the tailings that he/she resells to a cyanidation plant on an observed basis of KES 3,750 or USD 35.75 per tonne.

On-site buyers or traders

They are at the end of the mine site-level supply chain. The average buying volume is 50 g of unrefined gold per week per trader (the purity of the Osiri mine gold is estimated at 90%). Their estimated profit margin is KES 200–250 or USD 1.90–2.38 per g. Gold is sold to local buyers who transport it to Nairobi or smuggle it out of the country³⁷.

Cyanide leaching plants

Ten cyanide leaching plants, processing amalgamated tailings³⁸, are reported to operate in the Migori region. One plant, which uses nine leaching vats with Tanzanian technology and partners, reported a KES 5 million investment (USD 50,000), which was repaid in two months. The buying price of tailings paid to sluicing operations was reported as KES 3,750 or USD 35.75 per tonne representing 1.1 gram of gold content at 90% purity. These param are considered typical for the region.

Mineral Production Methods, Employment, and the Gender Division of Labour

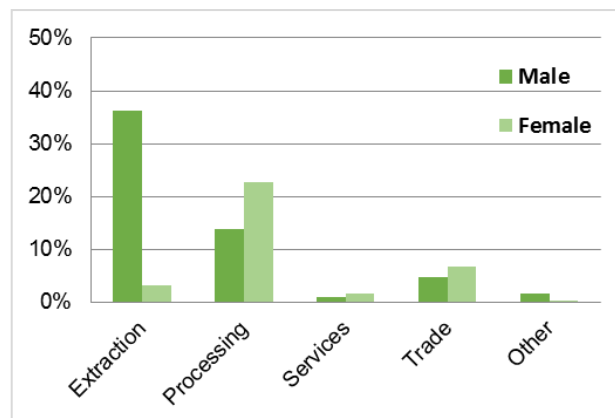
In Osiri, as in adjacent ASM areas in Migori, gold ore extraction and processing is carried out via underground extraction, crushing, milling, sluicing, and amalgamation, followed by amalgam burning and recovery of the *doré* (gold with residual mercury). **Direct mine and processing employment in Osiri was estimated at approximately 620 persons** (+/- 10%, 62% men and 38% women³⁹).

A distinct gender division of labour exists at Osiri (Figure 8), which has implications in terms of gender distribution of benefits from ASM in the area (see section 0).

Extraction

Men constitute 92% of the Osiri extraction workforce of approximately 400 workers. Underground mining takes place in one of four operating shafts, the most productive of which employs

Figure 8: Gender division of labour at Osiri Mine



³⁷ Mitullah et al. 2003

³⁸ Under the Minamata Convention, leaching of amalgamated tailings is considered one of the four 'worst practices' to be phased out.

³⁹ Excludes workers engaged in drilling and blasting, timbering, and supervisors.

approximately 100 men and yields approximately 100 sacks of ore per day from a main 60 m deep shaft connected to a gallery of tunnels that can extend for 100 m⁴⁰.

Extraction takes place in two phases.

- **During development/preparation**, drilling using jackhammers and blasting with explosives is followed by a four-hour period to wait for dust to settle and gases to evacuate. Underground workings are then inspected by the blaster man and timberman, and related timbering is done to support unstable ground.
- **During extraction**, paid labourers remove waste rock discarded by miners in sacks for disposal at the surface, whilst workers use hammers and pickaxes to break ore (exposed wall rock or fragmented by blasting) into transportable sizes that they later haul to surface in sacks. Workers typically are equipped with rubber boots and small flashlights.

Extraction takes place 24 hours per day, six days per week. However, downtime for drilling and blasting requires approximately eight hours per blast and is carried out twice weekly. Underground miners do not strictly work in set shifts or teams, but can choose to work individually or in teams of two to five and for several (typically two to three) hours as needed to acquire at least one full sack of ore. They gain entry to the mine only as others exit to ensure numbers underground are reasonably limited given space constraints⁴¹.

On their return to surface with their ore, they receive their share (a 2:1 ratio, split with owners). They then either sell or pay for processing of their ore and then break for the day or re-join the queue to return to work. Typically, men using bicycles haul ore in sacks to the processing areas.

Mineral Processing

Women constitute 62% of the mineral processing (crushing, milling, sluicing, amalgamation) workforce. The main steps (for all genders) include the following.

Crushing

Ore is manually broken using small sledgehammers on large tarpaulins into sizes that can be fed into the mill (approximately 1 inch in diameter). Crushing takes place in 30–40 areas around the site and is largely carried out by women (approximately 80%).

Milling

Crushed ore is fed into locally constructed, generator-driven octagonal ball mills to reduce its size into that of fine powder. Each milling unit is comprised of one or two ball mills and can process approximately 20 bags per day. Although 37–40 mills are located at Osiri, only about 10 mills are active at any given time. Milling units are staffed by an owner or paid worker, mainly men.

Figure 9: Most miners rely on small hammers, chisels, and a headlamp



⁴⁰ For those who purchase ore and pay for processing, an average (and exceptionally high) cut-off grade of about 1.7 g per bag or 24 g per tonne is estimated⁴⁰. However, the grade is highly variable (with many ore buyers reporting occasional losses), thus an average grade of 18 g per tonne was applied for the purpose of estimation.

⁴¹ Approximately 120 miners are underground at any given time in the four shafts (ranging between 10 workers for the smallest shaft and up to 60 for the largest).

Sluicing and amalgamation

This is performed individually or in teams of two, wherein one person carries out sluicing and the other conducts amalgamation. Although mainly done by women, some men also do this work. A two-person team can process approximately five bags of milled ore per day. Although 50–60 sluices are found at Osiri, only around 40 are active at any given time.

- Sluicing involves slowly pouring milled ore with process water over an angled, wooden sluice box lined with a burlap mat wherein heavier particles (i.e., gold) are trapped. Residual mercury is in process water, thus an initial (but limited) phase of amalgamation takes place.
- Once a sack has been processed, the mat is carefully removed and washed in a plastic basin to remove particles retained in the fibres. Throughout the process, tailings (waste) collect in a small basin at the end of the sluice and are periodically removed with a shovel and stacked in adjacent piles for sale to cyanidation plants.
- Amalgamation takes place in small impoundments next to sluices. Mercury is added to the concentrate recovered from the mats⁴² and mixed by hand in basins resulting in the formation of a mercury gold amalgam. Waste (residual mercury, lost gold, waste minerals) is discharged into the pond. The amalgam is squeezed through a piece of cloth and the amalgam taken for burning and sale to nearby traders.

Figure 10: Sluice mats are washed by women to recover concentrate before amalgamation in nearby impoundments



Amalgam decomposition

Gold buyers burn the amalgam using a small torch or on a charcoal fire just outside their small, covered, iron sheet-walled 'shops.'⁴³ Mercury vapour is released into the atmosphere, and remaining gold is weighed and purchased based on a purity of 90%.

Child labour

Child labour exists, but to a lesser degree than anticipated. Although some boys and girls were observed at the sites, few were visibly engaged in ASM activities and those involved seem to be carrying out hauling activities. This is consistent with results of household surveys, which indicated that, on average, 1.8 individuals within a household of 5.4 members are economically active, whilst 3.4 household members are above the age of 15 years^{44,45}. Notably, however, only 17% and 19%, respectively, of women and men engaged in ASM indicated that they had carried out another economic activity prior to engaging in mining, suggesting that entry to mining in the area starts early.

⁴² Under the Minamata Convention, amalgamation of concentrates (avoiding the worst practice of 'whole ore amalgamation') complies with recommended practices as long as substitution of amalgamation is not feasible.

⁴³ Under the Minamata Convention, amalgam burning in residential areas needs to be phased out, as it counts as one of the four 'worst practices'. Amalgam burning must be done in dedicated areas, using mercury-recovering devices such as retorts.

⁴⁴ Men are only slightly more likely to be economically active than women (17% versus 15%) and the ratio of boys to girls below 15 years of age is 1:1.

⁴⁵ On average, a Migori household has 2.5 children of school going age, practically all of which (2.49) reportedly attend school, despite approximately half of households reporting that affording fees is a major concern. Note: these results are presented for qualitative purposes only as 2.49 of 2.5 children suggests the unlikely event that babies and infants are not present or were not counted in the surveys and results are not statistically significant ($p > 0.05$).

Child labour may have reduced in recent years, potentially due to a combination of heightened attention by regulators and efforts to formalise activities, increased awareness of risks of child labour, or a combination therein. Indeed, many women miners consulted expressed that their ability to pay school fees was one of the most important benefits of their work in ASM.

Environmental and Occupational Health and Safety (OHS) Concerns

Most serious concerns

One of the most significant environmental and OHS issues in the Migori gold mines relates to extensive misuse of mercury in the production process. In terms of these affects, the most significant concerns are highlighted⁴⁶.

Cumulative mercury emissions are substantial.

Amalgamation is practiced on concentrates obtained from sluices. Whilst this marks a significant improvement over amalgamation of whole ores, mercury losses are likely equal to or slightly more than gold production. Based on this, it is estimated that approximately 70 kg of mercury per year is emitted from Osiri and approximately 1.2 tonnes of mercury is lost from all sites in Migori County in the same period⁴⁷.

The most significant human health risk from mercury is caused by its inhalation during amalgam burning. Although some mercury absorption through skin can occur during amalgamation, the most significant human health issue relates to inhalation of mercury vapour during amalgam decomposition (burning). This takes place immediately outside the doorways of small buying shops, though burning within confined spaces (buying shops) is also likely.

Atmospheric mercury emissions from burning are estimated at 30–47 kg per year at Osiri and 490–765 kg per year across Migori County, much of which likely settles near to burning sites.

The most significant risks are faced by traders burning amalgam, as well as gold sellers observing the process and those working in the immediate vicinity of traders (mainly processors)⁴⁸.

Women comprise 59% of traders and 62% of processors, yet due to inequalities in education status, access to information, and financial capacity, among others, **women are likely to be less aware of related mercury exposure risks than men, but may be more subject to exposure**⁴⁹. Given the severity of risks to the developing foetus, babies, and small children, specific attention on women of childbearing age is warranted.

Longer-term environmental impacts are likely localised around gold processing sites but may extend far downstream from cyanidation plants. Mercury amalgamation is largely carried out in

Figure 11: Few children were observed in mine work and found around work areas, such as those playing on this tailings heap



Figure 12: Charcoal stove used for amalgam burning



⁴⁶ Estimated for production methods used at Osiri and surround gold mines based on typical mercury losses to the environment for different production methods provided in. Veiga et al. (2006). Notably, although concentrates are subjected to amalgamation at Osiri, mercury is visibly evident in process water used in sluicing thus some degree of early amalgamation is expected, with excess mercury from sluices largely being collected with tailings from sluices and sold to cyanidation plants.

⁴⁷ Based on an mercury lost: gold produced ratio of 1:1, estimated production at Osiri (approximately 71 kg per year) and Migori County (1.06–1.5 tonnes of gold per year).

⁴⁸ Estimate based on an amalgam ratio of 60–70% gold to 40–30% mercury and a resulting ore containing 2% residual mercury, as drawn from Veiga et al. 2006.

⁴⁹ Personal protection equipment (PPE) against mercury exposure (gas masks with mercury capturing filters) is not available at mine sites. Improvised protection devices, such as dust masks or handkerchiefs, do not protect against mercury vapour.

small impoundments at gold sites, with a portion of excess mercury retained in process water and 'recycled' within unlined ponds.

Other concerns

A more serious concern is that mercury retained within the tailings recovered from impoundments is then sold to one of the 10 cyanidation plants in the region. Mercury and cyanide forms a strong complex that can stay in suspension in rivers and watercourses for significant distances prior to its breakdown. Cyanide stimulates the growth of the methylating bacteria that prompts conversion of mercury to a highly bioavailable form, methylmercury. Methylmercury is subject to biomagnification in aquatic systems, with the most profound risks associated with regular consumption of fish occupying high levels in the food chain (e.g., carnivorous fish).

Most drainages in Migori discharge into Lake Victoria, which hosts fish stocks of major livelihood, economic, and food security significance. Though the sheer size of Lake Victoria reduces risks of broad health impacts, cumulative impacts of years of mercury misuse in major ASGM areas around Lake Victoria (e.g., Migori in Kenya, Busia and Bugiri in Uganda, Geita in Tanzania) provide cause for concern.

Despite concerns from mercury misuse, the main occupational concern expressed by women and men working in Osiri and nearby gold sites relates to severe risks encountered whilst working underground. These include **fatality or serious injury caused by the collapse of tunnels and shafts, suffocation in oxygen-depleted areas, and drowning due to flooding of workings.** Whilst this risk is mainly borne by men who dominate this activity, repercussions on families left behind can be severe.

Additional risks occur during rock breaking (underground and at surface during crushing and milling). **Chronic dust exposure can lead to silicosis and other respiratory diseases,** whilst flying rock fragments can easily injure workers or cause blindness.

Other significant environmental concerns relate to deforestation, mainly related to underground timbering demands, and disturbance of the landscapes that can impede future, post-mining land uses or pose current risks to people or livestock (e.g., abandoned pits). Waste volumes can be significant (i.e., approximately 3,700 tonnes of tailings are generated from Osiri per year)⁵⁰ and, as most tailings are further processed at cyanidation plants, the risk of entering nearby watercourses warrants further assessment.

Figure 13: Although well-timbered, this shaft is plagued by frequent flooding and is at a depth prone to collapse



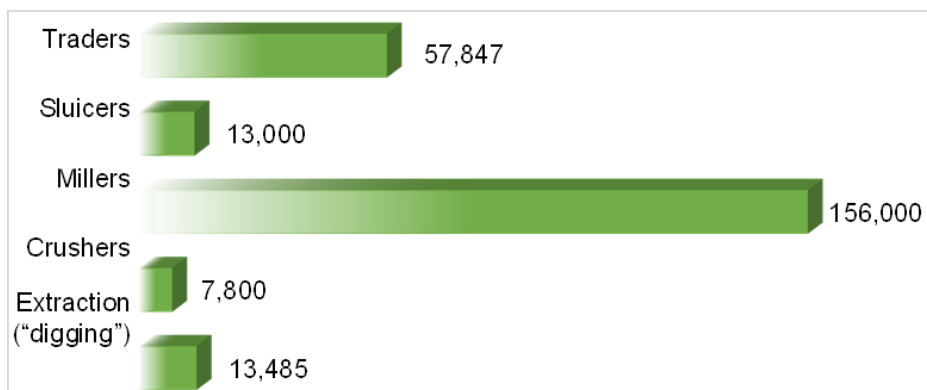
3.1.3. Distribution of Benefits across the Supply Chain

Gold production at Osiri was estimated at around 228 g per day based on an average daily ore production and grade of 12 tonnes and 19 g per tonne, respectively. Based on this, the distribution of labour and payment structure, average monthly gross revenue of individuals working in a specific occupation were estimated (Figure 14)⁵¹.

⁵⁰ Calculated based on ore production rates and grade, cross-checked with estimates for gold production.

⁵¹ Millers have expenses to perform their service mainly fuel and amortization of equipment. Blaster and timbering workers' revenues were not assessed. Owners and managers' revenues were not assessed as individual but as a group (see Figure 16). Additionally, mine workers engaged in activities not involving ore production (e.g., shaft development, cleaners) are paid on a daily basis of KES 300 or USD 3 (KES 7,800 or USD 78 per month).

Figure 14: Average gross revenue per individual in KES per month



Once gold is produced, it is sold to local traders. Although all gold dealers' licences were revoked in 2013 (following the discovery that conflict-tainted gold was being informally introduced in the country⁵²), gold traders continue to operate informally in all gold-producing villages. As legal export of informally traded gold is impossible, artisanally mined gold is exported informally (at the 'benefit' of evading the 5% royalty), mainly to Uganda, then onward to the United Arab Emirates (UAE) in the raw state or refined once in Entebbe.

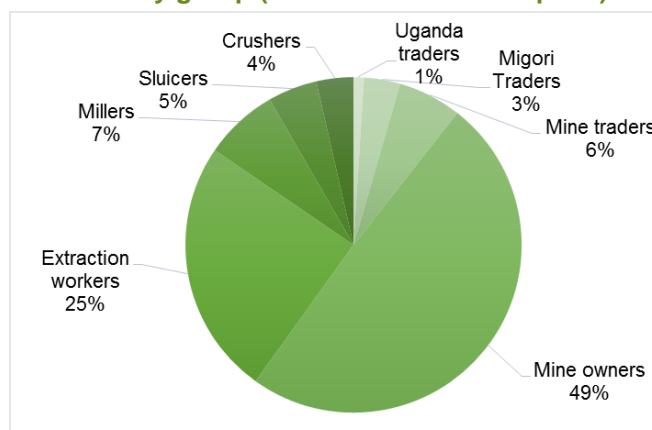
illustrates the supply chain downstream from the mines and the characteristics at each stage.

These additional data allow for calculating the distribution of the gross revenue share per group, according to what has been observed in the Osiri mine (Figure 16). The distribution is presented as a percentage of the London Bullion Market Association (LBMA) gold fixing.

Figure 15: Kenya ASGM supply chain (buying prices are expressed as a percentage of LBMA fixing)



Figure 16: Gross revenue share by group (based on London fix price)



⁵² Since 2014, only gold producers can officially export gold. As a consequence, gold exports dropped significantly, from USD 87 million in 2013 to USD 10 million in 2015. For further details, consult Annex 4.

Gender Distribution of Benefits

This division of labour has significant gender implications in terms of the distribution of benefits from working in the mine. Women work in large numbers in many of the lowest paid jobs (e.g., crushing, earning KES 7,800 or USD 78 per month) and are largely excluded from lucrative work in mill operations (yielding around KES 156,000 or USD 1,560 per month)⁵³. **Women in the ASM workforce yield only 11% of the revenue share despite comprising 38% of the workforce**, mainly due to their dominance in lowest paying jobs (e.g., crushing) and difficulty obtaining more lucrative work. Indeed, about one-third of men (35%) in Osiri indicated that entry to the sector was difficult, whilst almost half of women (44%) expressed the same.

Although women are also slightly more active in trading than men (59% vs. 41%), far fewer individuals have the financial resources needed to work in this capacity. Given extensive competition with men for jobs in extraction, harsh working conditions, and the severity of the risks involved, few women seek to work underground and expressed discriminatory beliefs preventing them from doing so. Nevertheless, **only 18% of women miners surveyed expressed a willingness to abandon their job** (compared to 26% of men), suggesting that work in the mines nevertheless provides important economic benefits that are difficult to obtain in other livelihoods.

Socio-Economic Benefits

ASGM and trade fuel the local economy, stimulating a host of spin-off employment and economic benefits for a multitude of women, men, and their families. With Osiri's estimated population of 2,000–3,000 people⁵⁴, OCDC manages more than 50 shops from pharmacies to haircutters, five hotels, and 37 restaurants,⁵⁵ contributing to a bustling local economy. **Based on Osiri Village alone, an economic multiplier of 3.8 spin-off jobs for every job in mineral production was estimated**⁵⁶.

At the district level, villages like Masara or Kihancha are intensively active, also due to ASM activity, with an active metal work industry and mechanical repairs to provide and repair tools and machines used in the mines, in addition to a multitude of shops, restaurants, and hotels. Cumulatively, an estimated USD 37 million is injected in Migori County annually, stimulating creation of approximately 38,000 additional, non-mining jobs in the area⁵⁷.

3.1.4. Key Findings

The selling price in Kampala, the regional gold hub, is around 98–99% of LBMA, allowing the Kenyan seller who exported the gold informally from Kenya to repatriate in Kenya up to this amount. Even if exports are informal, foreign currency through the gold sales abroad flows into the Kenyan economy and contributes to its strengthening. **Under this scenario, up to 99% of the value of the gold can return to Kenya and be injected into the economy.**

Around 50% of the value of the gold goes to those working in ore extraction, processing, and mineral trading directly, contributing to the local economy. These expenditures, estimated at USD 37 million per year in Migori County alone, represent a substantial contribution to local growth, employment, and development.

Women in the ASM workforce yield only 11% of the revenue share, despite comprising 38% of the workforce, mainly due to their roles in lowest paying jobs (e.g., crushing) and resulting difficulty to obtain capital (among other barriers) needed to gain access to more lucrative jobs (e.g., sluicing).

⁵³ Notably, prior to the proliferation of ball mills in Migori, grinding was likely carried out manually (e.g., using steel mortars and pestles or grinding stones) and, as found at sites in neighbouring Tanzania and Uganda, may have been previously dominated by women. As found in East Africa and globally, as equipment is introduced into ASM, women are typically less likely to control and benefit from mechanisation and their jobs are often rendered obsolete. Hinton 2003, Hinton 2016

⁵⁴ Interview with a member of the Osiri mine committee on 27 September 2016.

⁵⁵ Ibid.

⁵⁶ This multiplier is based on the village immediately within the mining and accounts for economically active aged residents relative to mine workers. Given that miners expenditures undoubtedly reach.

⁵⁷ Estimating that two-thirds of the production is locally spent and based on an average of 1.3 tonnes for every 10,000 miners, the impact of ASGM in the district in terms of local spending is about USD 37 million. Based on direct, induced employment calculated for Osiri (3.8), multiplier effects in Migori County likely induced 38,000 jobs.

Nevertheless, few men and fewer women (26% and 18%, respectively) are willing to forego work in the mines, suggesting the benefits largely outweigh the costs compared to other opportunities.

Direct taxes are absent in the revenue distribution. However, indirect taxes through worker or owner spending (e.g., value added tax [VAT]) or fuel consumption significantly contributes to the Kenyan budget. Assuming that 50% of the revenue of the miners, processors, and traders and 25% of the owners' revenues are spent in goods and services taxed by VAT, the value contributed to the national budget is near to 6% of the LBMA value of the gold, based on an estimated annual production of 5.2 tonnes, and amounts to USD 13.4 million. As a comparison, Kenya tax revenue as a percentage of GDP was 16% in 2012, or USD 8 billion⁵⁸.

Environmental and health risks associated with mercury misuse are significant. However, more than two decades of experience in tackling this issue via policy, legal, trade, technical, organisational, and other approaches provide significant guidance for addressing this issue⁵⁹. Introduction of mercury-reduction approaches to progressively move towards the elimination of mercury are needed, but **should be cognisant of risks in exacerbating gender inequalities through their introduction and of the many barriers miners face to reduce or eliminate their mercury dependence.**

Other OHS risks deserve action. Efforts should address priorities identified by most affected stakeholders and risks associated with underground instability, ventilation, flooding, and chronic dust exposure, among others.

Child labour is likely most pronounced in the most informal sites. Little evidence of child labour was observed at Osiri and is consistent with surveys indicating that of 5.4 household members, only 1.8 are economically active, though 3.4 are above the age of 15 years. In fact, many women miners indicated that payment of school fees was one of the main reasons for their work in the mines. However, these findings do not preclude child labour in Osiri and less-formal ASM areas.

Area residents and miners value ASM as a livelihood. Of the economically active population, 73% are individuals are engaged in some form of ASM, most of which (78%) do not wish to abandon mining for other economic activities. Most women (65%) and men (72%) surveyed believe that earnings in mining exceed those from agriculture, but the activities have enabled many miners who were interviewed to invest in other activities, including through acquisition of land, investment in small shops, and improvements to their homes.

3.2. Case Study: Taita Taveta County

Kenya is well known for gemstone mining and more than 60% of annual national production is attributed to ASM. This section summarises the sector in Taita Taveta County, one of the country's main gemstone producing areas. Located within a gemstone belt that spans Kenya and Tanzania, the county produces high- and middle-value gemstones, including green and red garnets, ruby, blue and pink sapphire, green and yellow tourmaline, rhodolites, and kyanites⁶⁰.

As the main global source of tsavorite (green garnet), **Taita Taveta County is uniquely positioned to establish a signature gemstone market** with significant development potential through support to ASM. As described herein, achieving such an aim will require a complex, multi-faceted approach.

⁵⁸ World Bank. Kenya Tax Revenues (% of GDP). Retrieved from <http://data.worldbank.org/indicator/GC.TAX.TOTL.GD.ZS?locations=KE>

⁵⁹ The Global Environmental Facility (GEF) Gold Programme and UNIDO/UNDP/GEF Global Mercury Project (GMP) provide significant guidance.

⁶⁰ Pohl & Horkel 1980, Horkel et al. 1984

Figure 17: (left) A diversity of gemstones of Taita Taveta displayed at a trader’s office; (right) The arid savannah and bushland against a backdrop of steep mountains



3.2.1. The Context

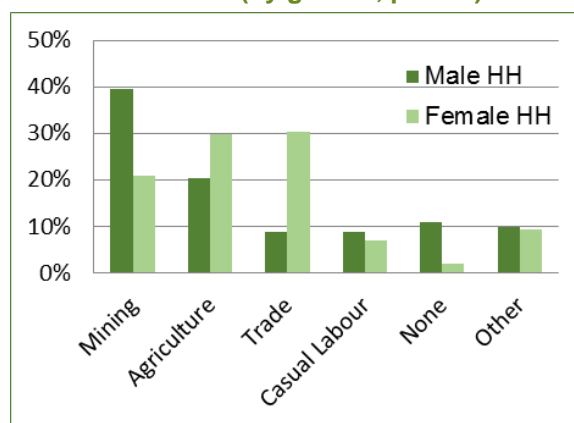
Livelihoods, economic potential, and the natural environment are inextricably linked in Taita Taveta. The landscape is diverse, from hot, arid plains to steep mountains, with elevations ranging 300–2,200 m and contrasting variations in climate (with rainfalls varying from 440 mm in lowlands to 1,900 mm)⁶¹.

The area is expansive, extending to 17,084 km², although only 12% is arable and 62% is covered by two national parks (Tsavo East and Tsavo West)⁶². Land use is further impacted by 773.4 km² coverage of 28 private and public ranches and large areas occupied by three commercial sisal estates, which average 7,400 ha each⁶³.

Under these conditions, the primary livelihood options for the population of more than 320,000 include livestock rearing, farming, and work in ASM, in addition to jobs in small business, public service, and, to a lesser extent, larger mining and sisal companies⁶⁴. In the most gemstone-reliant sub-counties, Mwatate and Voi, **ASM provides the main source of employment for 57% of women and men** of economically active age, well above agriculture (39%), trading (35%), and other activities.

Agriculture is often practiced alongside mining and was identified as a livelihood source for 20% of men and 25% of women (Figure 18). **Distinct gender differences were observed**, wherein 40% of men and 21% of women participate in mining, whereas 31% of women and only 9% of men participate in some form of trade.

Figure 18: Livelihood activity of economically active individuals (by gender, p<0.05)



Many factors may account for high participation rates in ASM and gender differences in workforce composition.

Low economic status likely plays an additional role in attracting many people to work in the mines. For example, of households surveyed:

- 29% more households headed by men own small- and medium-sized livestock than women-headed households (Annex 6)

⁶¹ TTCG 2013

⁶² Ibid

⁶³ Ibid

⁶⁴ In 2009, the national census reported the county population as 284,657 and a projected 2015 population of 329,381 (168,169 males and 161,212 females). TTCG 2013

- Almost 100% of households headed by men own at least one mobile phone, whilst only 66% of women-headed households own a mobile phone
- Radios are found in 57% of male-headed households, but only in 19% of women-headed households
- Bicycles can be found in 49% and 19% of households headed by men and women, respectively.

Although women are clearly disadvantaged with respect to assets, their comparatively low education levels likely provide additional constraints (Annex 6). Only 29% and 24%, respectively, of men and women are educated beyond primary school level. **Approximately one in four women have no formal education**, (compared to one in 10 men), despite relatively high primary school coverage (261 primary schools serving 56,988)⁶⁵. **Only 7% receive post-secondary education**, despite the presence of one university, one public institute, one teacher's college, and four private tertiary colleges⁶⁶

In addition to a lack of alternatives and poverty drivers, **local perceptions undoubtedly also play a role in high participation rates in ASM**. Within male- and female-headed households, respectively, 81% and 66% consider work in mining to be a better job than other jobs, whilst only 10% of men and 19% of women considered it to be worse.

Both men and women consider it easy to get engaged in mining (61% and 58%, respectively) and approximately half (52%) believe that someone employed in a **mining activity earns more money** than an agriculture worker. Furthermore, among those engaged in mining, **69% did not wish to abandon their jobs in the mines**.

In subsequent sections, incomes across gemstone value chains are examined alongside potential negative implications and risks associated with the activity, providing insight into the livelihood significance of gemstone production by ASM and the ways to increase the local development contributions of the sector.

3.2.2. Supply Chain Actors, Activities, and Employment

Main Supply Chain Actors

Different types of gems are traded along the ASM supply chain. According to official export permits, the most traded gem in value is tsavorite, followed by tourmaline, zoisite (tanzanite), garnets (excluding tsavorite), opal, sapphire, and ruby. In Taita Taveta County, the most mined stone in value is tsavorite, the finest gem mined, followed by tourmaline or ruby⁶⁷.

The supply chain involves different stakeholders at mine site and along the trading chain. In Kasighau region, four different stakeholder groups could be identified:⁶⁸

- Landowners: the community that owns a piece of land (a 'ranch')
- Cooperative or company: they own the mineral rights and are accountable before the authorities
- Pit owners or sponsors who finance the extraction
- Miners

⁶⁵ TTCG 2013

⁶⁶ Ibid

⁶⁷ According to field interviews with traders and miners.

⁶⁸ Based on information collected during a field visit in Kasighau region where different mines were visited.

Mineral Production Methods, Employment, and the Gender Division of Labour

Whilst many miners in Taita Taveta continue to rely on alluvial mining, the majority of activities focus on higher grade, hard rock primary sources. Most extraction takes place using underground mining methods prior to the sieving, sorting and sale of products. Activities range from completely manual (artisanal) to somewhat mechanised (small-scale).

Total direct employment across Taita Taveta County is estimated at approximately 5,00069, of which 85% of the total workforce is composed of men and 15% are women and approximately 2,700⁷⁰ of which are associated with companies, CBOs, or associations. A distinct gender division of labour exists in Taita Taveta, with implications on the gender distribution of benefits from ASM (section 0).

Extraction

Men constitute 88% of the extraction workforce, and miners commonly work in small teams of three to eight people, to depths of more than 50 m.

In many cases, excavators are hired to remove overburden prior to commencement of underground operations. **It may take days, several weeks, or months of mine development before (and if) gemstone bearing veins and reefs are encountered.** Consequently, financing is often in the order of tens of thousands of dollars in labour costs, equipment (e.g., water pumps, compressors, jackhammers) and supplies. Similar financial challenges may be encountered during production, where promising indicator minerals (including low-value gems) do not lead to a viable deposit or deposits are rapidly depleted without reasonable returns on investment.

During development/preparation, extraction is manual or semi-mechanised, using jackhammers and blasting with explosives. Timbering to stabilise underground workings seems to be extremely limited with some sites leaving pillars in situ. Material is removed by workers using buckets or sacks. During extraction, because jackhammers and blasting can severely damage gemstones, resulting in losses to all parties, at many sites manual rock breaking is heavily relied upon once gemstone-bearing material is encountered.

The rate of ore production varies greatly, depending on the equipment used, number of workers and active tunnels and hardness of the rock. For example, sites relying solely on jackhammers can advance their tunnels at approximately 2 m per day, blasting can advance tunnels at approximately 5–7 m per blast, whilst manual tunnels in rock likely does not progress more than 1 m per day. Additionally, gemstones are found in pouches and there is no production whilst digging to reach them.

Mineral Processing

Limited processing is required during gemstone production. As such, only 8% of the mining workforce (including those in extraction, service provision, and related activities) is engaged in this phase of activities, of which only 19% are women. **Activities mainly involve sifting through and sieving ore obtained from sacks and hand-picking of visible gemstones**, often carried out by or under the

Figure 19: Division of labour in Taita Taveta gemstone mines (by gender, $p < 0.05$)

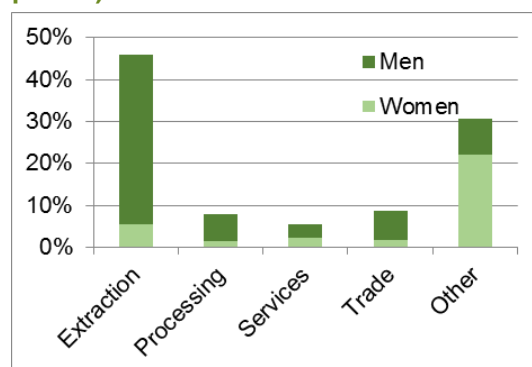


Figure 20: A series of adits (mine entrances) are excavated to access the same gemstone-bearing shear zone



⁶⁹ Reportedly, up to 10,000 miners are active across Taita Taveta. However, prices for many gemstones have declined by approximately 50% and many sites are inactive due to lack of production and/or financing.

⁷⁰ Anyona & Rop 2015b

watchful eye of owners. Gemstones are washed with water and sometimes treated with glycerine prior to sorting according to type, size, and quality.

Few traders carry out in-house cutting and polishing within the county. In one case, a gemstone cutter with 14 years of experience in Mombasa was employed and paid a salary to work approximately 7 hours per day, enabling him to cut eight to 10 pieces daily.

Participation of young children in mine work appears to be limited, but youth (ages 15–24 years) are abundant at mine sites⁷¹. Potentially due to the structure of work and composition of the workforce (e.g., an owner overseeing activities, much work in remote camps in often fenced off ranches, low participation of women), few young children were observed at work sites. However, hundreds of disadvantaged, desperate young men found working across the area could easily have commenced work prior to age 15 years, given that 20% of men miners and 14% of women miners reported not working in other sectors (e.g., farming, trade) prior to work in the mines. The median age of households surveyed in Mwatete and Voi is low (37 years), only 36% of household members are under 15 years of age, and many households consist of economic migrants.

Figure 21: One of the few gemstone cutters in Taita Taveta



Environmental and OHS Concerns

The nature and severity of environmental and occupational risks in Taita Taveta's mines is closely tied to water scarcity. Most gemstone mining takes place in the arid plains mainly comprised of savannah and bushlands, where water resources are limited and therefore sensitive to disturbance in terms of quality and quantity, although local conditions suggest such impacts are limited (Annex 6).

Lack of water does present serious occupational risks, mainly associated with dehydration and sanitation-related diseases. Additional risks occur during rock breaking, particularly where jackhammers are used without water. **Chronic dust exposure can lead to silicosis and other respiratory diseases, whilst flying rock fragments can readily injure workers** (Figure 22).

Conversely, **water scarcity can reduce risks associated with underground instability and resulting tunnel collapses**. Nevertheless, as most ore-bearing reefs are found within shear zones, influx of ground water may be encountered in some sites, increasing the risk of tunnel collapse. Where available and necessary, water pumps are employed. Timber use is rare (likely in part due to scarcity of forest resources) and some sites rely on rock pillars.

Figure 22: Dust exposure during dry rock breaking with jackhammers



Given the prevalence of wildlife and high poverty levels faced by some miners in remote camps, **risk to biodiversity** through bushmeat hunting and poaching is high.

Important occupational risks also relate to insecurity. Many miners frequently travel great distances to camps in largely unpopulated areas, often on foot or by bicycle. En route to and from sites and whilst in the camps, **mine workers may be subject to attack and potentially even sexual assault**. This risk is likely most pronounced for female miners and may be one factor limiting their participation, but (as found in other localities) may also pose risks for vulnerable men.

⁷¹ Based on UNESCO definition (for more information consult: www.unesco.org/new/en/social-and-human-sciences/themes/youth/youth-definition/) and on-site observations and interviews.

Although sexual and gender-based violence (SGBV) was not evaluated during the research, **human rights abuses against women workers** in Taita Taveta have been reported, mainly related to assault of approximately 100 women involving intimate body searches for gemstones by a mine owner.

Given the nature of working conditions and lack of standards in general concerning environmental protection, labour rights, and OHS and as found in other ASM jurisdictions, **additional assessment of SGBV risks is warranted**, including alongside much-needed efforts to introduce basic measures to ASM sites in the area, such as pit backfilling, use of personal protective equipment (PPE) and enforced codes of conduct.

3.2.3. Distribution of Benefits across the Supply Chain

Economic Relations at Mine Site

The basis of the economic relations between supply chain actors is production sharing. In this case, the Chawia Minerals Association (CMA), a CBO formed with the objective of bringing together artisanal and small-scale miners in Chawia Ward/Taita Taveta, is an important stakeholder in the supply chain. Landowners take a 10% share of CMA production, plus a toll charge to every vehicle entering the ranch to finance the security of the entrance gate⁷². They also charge mining companies, cooperatives, and some pit owners (mining companies operating in the ranch) a fixed amount of KES 50,000 or USD 500 per year⁷³. The total annual fixed levies for the use of the land to the community totals KES 200,000 (USD 2,000).⁷⁴ CMA takes a share of 25% of the production. Sponsors, who are pit owners investing and paying the miners at the Chawia Mine Site, take the rest of the share (65%). They sell the production together with the cooperative to have a balanced distribution of the revenues.

In a unique instance, one of the mining companies operating in the community ranch, Flash Mining Co., pays miners either on a production share basis (30% for tourmaline and 20% for tsavorite) or on a fixed basis of KES 10,000 or USD 100 per month. The company employed 16 workers at the time of the visit.

Economic Relations after Mining Production

Any Kenyan gemstone trader needs a licence to operate. The cost of the licence to sell nationally is KES 20,000 or USD 200 per year. Gemstone exportation requires a permit that is issued by the MOM in Nairobi on every international shipment upon payment of the required royalties.

Trading of gemstones in Kenya is complex and largely informal, and different types of trades occur.

- Medium-size companies sell their production to international traders based in the country or export it directly to international markets.
- Most of the gemstone production is sold to local traders by producers.
- Quality gemstones are primarily sold to local traders, who later resell the gemstones to exporters in Nairobi or informally export them to traders in Arusha.
- Some of the best pieces are directly sold in Asia or Europe.
- Good quality tsavorite is also sold to Sri Lankan buyers in Voi.
- Low-quality and small gemstones are sold to Indian traders active in Voi, who then informally export them.
- Mine site traders also trade directly with individual miners and they primarily resell in Voi.

Only a small part of the Kenyan production is locally cut before being exported. The cutting industry in Kenya is small and cutting skills have been low for a long time. Cut gemstones represent 66% of the official exports (for a value of USD 3.1 million in 2015). However, this percentage does not reflect the reality of the exports; most the gemstones are believed to be exported in rough. The main reason for cutting is a lower royalty (1% vs. 5% for rough stones), confirming that a low royalty is an effective formalisation tool. Because of its high value⁷⁵, tsavorite accounts for the majority (83%) of the cut gemstones officially exported. Tsavorite was known only to mineral specialists until 1974, when Tiffany

⁷² According to the CBO management.

⁷³ According to the interview of the chair of the community/landowner, no levy is taken on production.

⁷⁴ According to the chair of the community/landowner.

⁷⁵ Prices of a Tsavorite can vary from 1 to 100 depending on purity, colour and size.

& Co. jewellery company launched a marketing campaign that brought broader recognition of the gemstone and helped propel it to the fine jewellery range of products⁷⁶.

It is believed that the main major exporter of Tsavorite is the company Lapigems, which has integrated a cutting workshop in Nairobi⁷⁷. In Arusha, Tanzania there is a large gemstone cutting sector, more developed than in Kenya. **Cut gems also benefit from a reduced royalty in Tanzania (1%), which attracts a significant part of the rough gems extracted in Kenya.**

The gemstones market is different to the gold market. Gemstones are an over-the-counter market, where there is no set international price; rather, the quality of gemstones determines their value. Valuation of rough gemstones requires special skills, practice, and background. Therefore, gemstone buyers are not as abundant as gold buyers, where every jeweller is a potential buyer. This market's complexity allows traders to have more commercial power, especially in an informal market where transactions take place in secret. Consequently, traders' margins can be as high as 100% of the buying price (also because of the high risks assumed by the buyer on the final quality)⁷⁸.

Micro-Economics of ASM Gemstones in Taita Taveta

Gemstone mining is a key economic contributor in Taita Taveta County. Whether individually, through community-based associations, or a given company, the extraction of gemstones is a labour-intensive activity. It has to be manually performed through artisanal to small-scale methods. Consequently, the activity has a high social impact in the county. However, the sector is characterised by informality, conflicts over land endowed with minerals, unavailable information, secrecy along the supply chain, and smuggling of most of the production⁷⁹.

Official export permits granted by the MOM in 2015 show a record of 984 operations, totalling USD 4.7 million⁸⁰. The Kenya Revenue Authority (KRA) reported for the same year only USD 2.6 million for gemstones exports. A rapid analysis of the exports permits value shows that:

- More than 50% of the gemstones export permits are for tsavorite
- 93% of the exports come from five gemstones types (tsavorite, tourmaline, zoisite, garnets, opal)
- Two-thirds of the exports were cut gemstones, for which the royalty is 1%, versus 5% for rough gemstones
- Less than 1% of the tsavorite was exported rough
- Approximately 98% of tourmaline exports were exported rough
- More than 87% of the exports permits were exclusively sourced from Taita Taveta County
- 63% of the exports permits were granted to U.S. traders, 14% for India, and 13% for Hong Kong

The research team estimates that the official export permits represent only 5–10% of the real number exported unofficially⁸¹.

Taita Taveta has approximately 10,000 miners in the extractive and processing sector⁸². Half of those are employed by companies and paid on a production share basis that varies 20–30% of the extracted

⁷⁶ Idar-Oberstein, International Coloured Gemstone Association.

⁷⁷ Company website www.lapigems.com

⁷⁸ The trading margin is not surprising. Trading margins in gemstones always depend on the characteristics of the gemstone (i.e., the risk that a certain rough stone can be turned into a cut stone of the anticipated value). Gemstone appraisal requires gemmological equipment and a lot of experience specially when not cut, which traders at mine sites do not have. Traders consequently buffer this risk by a higher trading margin. However, their profession is still fraught with risk: higher level downstream traders only 'pick' the best stones, and the low quality material has to be sold off at a discount price. Therefore a 100% mark-up on some stones may not be as lucrative as it appears at first glance.

⁷⁹ These circumstances did not allow the team to gather sufficient information in order to assess the economic and social impacts of the sector based on the mine site assessments. In other words, is made it difficult to build a bottom-up approach to evaluate the sector.

⁸⁰ MOM source

⁸¹ Also, given that the margin of error is high and, due to the impossibility of assessing the sector from the mine site visits (a bottom-up approach), the researchers had to utilise a top-down approach.

⁸² The number was consistent in the interviews with Davis Mining directors (Daudi Osman and Ayub Ashraf Khan) on 2 October 2016, Taita Taveta County Regional Mining Director (Edward Omito) (MOM) on 1 October 2016, and Director of Lapigem (Antony Zagoritis) on 5 October 2016.

gemstones. The other half of the workers extract independently. They normally receive one-third of the extracted gemstones. Consequently, the average miner's share in the production is about 30%.

Miners' monthly revenues amount to KES 15,000 or USD 150⁸³. Based on the 30% share in the production, the annual local value of extracted gems per miner amounts to KES 600,000 or USD 6,000. Assuming traders generate a 100% mark-up on their gemstones, the annual national market value of the production for 10,000 miners adds up to KES 12 billion (USD 120 million)⁸⁴.

ASM Gemstones Income and Distribution

The national market value of gems is approximated at USD 120 million. This amount is roughly distributed as follows:

- USD 60 million is absorbed by traders
- USD 20 million for the 10,000 miners
- USD 20 million for the landowners and cooperatives
- USD 20 million for investors/sponsors

Miners' and landowners' shares can be assumed to be locally spent on food and locally sold consumer goods. Half of investors' share can be assumed to be directly spent locally. Half of traders' share can also be considered to be spent locally, thereby fuelling the local economy. Therefore, the local economic contribution can be estimated at roughly USD 80 million per year.

Considering that half of the miners' revenue is spent in VAT-taxed goods, Taita Taveta's gemstone miners contribute an estimated USD 1.6 million to the annual Kenyan national budget. This amount, which does not even include government revenues from landowners, sponsors, and traders, by far exceeds royalty revenues (estimated in USD 96,000 based on the export permits granted in 2015). By optimising the miners' revenues, the indirect VAT generated would contribute much more to government revenues than by tightening the control of exports.

Gender Distribution of Benefits

As taboos concerning the satanic nature of gemstones have begun to be broken and women's groups, such as the Taita Taveta Women's Association, are established, more women have begun to join the ASM workforce. Their participation continues to be low, constituting, according to the survey performed, 15% of the overall ASM workforce, much of which is in service provision (including cooks, camp maintenance, hauling water). Few are engaged at higher levels. For instance, only one in five mineral traders are women and, in one CBO, 15 of 230 owners and 20–25 of 1,500 workers are women.

As detailed in Annex 6, the **main constraints to women's entry to the sector** likely relate to financial resources, freedom to make decisions (e.g., to invest in mining, join a crew), comparatively lower levels of education, which affects confidence and capacity, stigmas associated with work in mines and risks of SGBV in and en route to ASM areas, among others. Furthermore, most jobs are in extraction, which (although women work underground in other ASM sites across East Africa) is extremely labour intensive, high risk, and frowned upon for women and may be unappealing to many women miners.

That being said, women likely yield an important proportion of spin-off benefits because they constitute 51% of the workforce in general trade of goods consumed by the mining and non-mining populations. Broader socio-economic benefits of gemstone sector-derived cash injected into the local

Figure 23: Women collecting water from a borehole in a trading centre for sale and household use



⁸³ The number is in line with gold miners in Migori County.

⁸⁴ The international value of the production could not be assessed because of the total secrecy and informality around the supply chain.

economy have trade-offs with impacts on other livelihoods. These largely relate to conflicts and in some cases displacement by savvy, well-financed gemstone investors and larger companies, compromising women's capacity to meet household food security needs.

3.2.4. Key Findings

Approximately 10,000 people are involved in gemstone mining and processing in Taita Taveta. Half of those miners are employed by small-scale companies and paid on a production share.

The national market value of the Taita Taveta gemstone production sums up to USD 120 million. Therefore, the local economic contribution can be estimated at roughly USD 80 million per year.

Miners' income spent in VAT-taxed goods in Taita Taveta **contributes an estimated USD 1.6 million annually to the Kenyan national budget.** This amount by far exceeds royalty revenues.

Women comprise only 15% of the ASM workforce, mainly due to requirements for work in extraction (rather than processing), issues related to the remoteness of sites and camp conditions, risks of SGBV, and stigma concerning women's work in mines. Although some women are pit owners, mineral traders, and CBO members and many work in ASM service provision, they are less likely than men to have the financial capital, agency, and confidence yielded from higher levels of education, which are needed to gain entry to the sector and more lucrative roles therein.

The primary environmental and OHS associated with ASM include poor conditions at mine camps, including sanitation and hygiene-related illness associated with water scarcity, dust exposure during rock breaking, and underground instability (risks of collapse and rock falls). Two additional risks warrant further study to determine their nature, scope, and severity: ASM-associated bushmeat hunting of wildlife within and adjacent to protected areas and SGBV within and en route to remote mining areas.

Engagement of young children in mine work appears to be limited but hundreds of vulnerable young men seem to dominate work at many sites. Much work takes place in remote locations served by work camps and few families live in immediate area of most sites. Other factors that may contribute to low levels of child labour relate to low female participation and the owner/investor and worker structure (rather than individual or family unit) production system. This does not preclude participation of young children, particularly in less formal, family-owned sites. It is a cause for concern that there are hundreds of disenfranchised, vulnerable young men found working across the area, many of whom may have commenced work prior to the age of 15 years or are currently underage.

Many residents consider work in ASM to be a better alternative than other options. Among men and women household heads, 81% and 66%, respectively, consider work in mining to be a better job than other sectors. Half of survey respondents (52%) believe that someone employed in a mining activity earns more money than an agriculture worker. Many miners left work in agriculture (28%), trading (17%), and other jobs (36%) to take up work in the sector. And, less than one-third of miners wish to abandon their jobs in the mines to seek other opportunities.

4. Micro- and Macro-Economic Contributions

4.1. National Economic Development

4.1.1. GDP Contribution

Extrapolating the micro-economic findings from the Migori case study (section 0) at the country level⁸⁵ and based on the estimation of 40,000 artisanal and small-scale gold miners (see section 0), the

⁸⁵ Under the assumption that non-assessed ASGM mines are like the Osiri one.

incurred gold production would amount to 5.2 tonnes or USD 224 million or 0.35% of the country's GDP. This confirms published estimations⁸⁶.

In conclusion, although informal, ASGM has significant direct and indirect social and economic impacts in Kenya. However, urgent formalisation policies are needed. With three of four workers informally employed⁸⁷, the cost of keeping the sector out of the formal sphere is high, particularly due to the environmental impacts that follow informal mining.

4.1.2. Tax and Non-Tax Revenues

The ASM sector is an important tax contributor, even though, due to its predominantly informal nature, direct tax payments by artisanal and small-scale miners are negligible. As shown in section 0, ASGM indirectly generates, through VAT spending, a minimum of 6% tax revenues of its mineral value. Compared with the titanium sands sector⁸⁸, the VAT paid by the ASGM sector generates 1.8 times more government revenues and national budget contribution.

The counterargument—that such VAT government revenues cannot be attributed to the ASM sector because a miner would have another activity if not in ASM mining—is not appropriate for several reasons. ASM revenue is higher than agriculture, which is one of the reasons for choosing mining over other alternatives. Furthermore, it is not realistic to assume that mining can be easily substituted with other activities of equivalent value in the short term.

4.2. Local Economic Development

4.2.1. Employment and Economic Multiplier Effects

A countrywide update of employment figures in the ASM sector has not been carried out since the International Labour Organisation (ILO)'s assessment in 1999⁸⁹, which reported some 30,000–40,000 artisanal and small-scale miners. Seccatore et al. (2014) quote World Bank Communities and Small-Scale Mining (CASM) data, according to which the ASM population reached somewhere in the vicinity of 146,000 people in 2012⁹⁰. The following sources can support an updated estimation:

- **Non-metallic minerals and construction materials:** Mwangi (2014) postulates that mining in Kenya is a relatively small sector, dominated by exploitation of non-metallic minerals such as soda ash, diatomite, gypsum, limestone, fluorite, constructional stone, and sand harvesting, of which a large percentage (estimated at 70–80%) is done by artisanal and small-scale miners. For the construction materials sector, quarrying (extraction of stone) is believed to employ more than 40,000 workers nationally, and in Nairobi alone it employs 10,000 people. Sand harvesting in eastern Kenya provides another 30,000 jobs.
- **Gold:** Mutagwaba (2010) estimated that about 10,000 people are directly involved in ASM in the western (Migori) region and approximately 15,000–20,000 are indirectly involved in the activity⁹¹. An extrapolation of the case study findings in Migori allowed a revision of this figure to 40,000 persons involved nationwide⁹².
- **Gemstones:** Gemstone mining (precious and semi-precious stones) occurs all over the country, but is concentrated in Taita Taveta. Rop (2015) assesses that about 500 gemstones mine sites in Taita Taveta sustain approximately 20,000 persons.⁹³

⁸⁶ Seccatore et al. 2014

⁸⁷ UNECA 2015

⁸⁸ The top mineral mining activity of the country, the titanium sands extraction, generated sales for its fiscal year 2015/2016 of USD 123 million and employed 922 persons contributing to the state budget in 2015

KES 298 million in royalties (USD 3 million) and AUD 40,000 (USD 29,000) in income tax. The contribution of the titanium sand sector to the state budget in royalties and income tax represents 2.5% of the mineral value.

⁸⁹ ILO 1999. Even recent official Government documents such as Vision 2030 (Kenya 2011) refer to ASM employment figures from 1999. Rop (2014) confirms this, expressing 'There is absolutely no data or information at the County or National level regarding ASMs currently. Such issues as to how many artisanal miners are in the county, the actual amount of money generated by ASM, [...] remain unresolved.'

⁹⁰ Note: The referenced CASM website (created with DFID funding) is no longer accessible.

⁹¹ Mutagwaba 2011

⁹² Consult Annex 4.

⁹³ Anyona & Rop 2015c, Rop 2014 [*P; OBS, assessment*]

Based on the numbers above, the non-metallic and construction minerals sector employ 90,000 people (quarries: 40,000, sand: 30,000, other: 25,000), of which approximately 70,000 (75%) are artisanal and small-scale miners. The gold mining sector, considering other counties such as Siaya and Turkana and the seasonal nature of the work, provides probably work for some 40,000 Kenyan citizens, whilst the gemstone sector countrywide might employ approximately 30,000 miners. **This confirms the importance of the ASM sector, providing employment for approximately 140,000 ASM miners**⁹⁴. Using the 2009 population and household census⁹⁵, which gave an average of six persons per household, the number of dependants can be estimated by multiplying the number of miners by six. **This means that more than 800,000 Kenyan citizens dependent on ASM.**

Comparing the 'social intensity' of ASGM with titanium sands extraction, in terms of the number of direct jobs per value created, USD 1 million of value created employs directly almost eight workers, when for the same value created by the ASGM sector directly employs almost 180 workers: a 1:23 ratio.

5. Conclusions and Recommendations

With recognition of the substantial development potential and livelihood significance of ASM, numerous governments around the world are now acting to put in place and sustain commitments to advance formalisation of the sector. Formalisation goes well beyond granting of legal status and tax collection to include multi-pronged and continuous efforts to address the technical, environmental, occupational, and social challenges and opportunities in ASM. Increasingly, these efforts are grounded in the principles of inclusivity to bring about an increase in voice, participation, and responsiveness to vulnerable groups, as well as equality, particularly with respect to the ways in which and to whom risks and benefits are distributed between women and men, boys and girls.

This study informs formalisation efforts for ASM in Kenya by providing insight into the sector's economic contributions and by identifying critical issues requiring emphasis, including within policy and legal reform processes. The study identifies ways in which the economic development potential of ASM can be realised as environmental, health, and social risks are mitigated. The conclusions and recommendations highlight the often-complex interaction of environmental, social, and economic dimensions that underpin both problems and solutions to that challenges faced by the ASM sector. Main conclusions and recommendations, some of which are commodity or region specific, are provided below.

5.1. Conclusions

5.1.1. Economic and Social Contribution

ASM activities have been a reality in Kenya for a long time, but only recently have they gained national visibility and earned the attention of the government as a contributor to the economy and to poverty alleviation. Although no official data is available, the ASM population was estimated at about 146,000 people in 2012. This number is very similar to the calculation completed as part of this research. The sector remains largely informal, but produces around 60% of the country's gemstones, most of its gold, quarried stones, and other construction materials.

More than 800,000 Kenyan citizens are dependent on ASM. This number was estimated using the 2009 population and household census⁹⁶, which gave an average of six persons per household. The number of dependents can be estimated by multiplying the number of miners by six.

ASM is by far the main source of employment in the communities surrounding mines, providing 73% and 57% of economically active aged residents in Osiri and Taita Taveta, respectively, with some form of work in the mines. Indeed, 66–81% of residents of these areas consider work in ASM to be a better alternative than other livelihood opportunities. Of those engaged

⁹⁴ This estimate, completed as part of this research, corresponds closely with the CASM data from 2012.

⁹⁵ KNBS 2010

⁹⁶ Ibid

in mining, 74% and 77% of miners in Osiri and Taita Taveta, respectively, prefer not to abandon work in the mines for other livelihoods⁹⁷. More than half of residents in these areas believe that incomes in mining are higher than in agriculture and other sectors.

5.1.2. Legal Opportunities and Challenges

The Mining Act embraced the official recognition of the ASM sector and the need for different legal treatment in terms of the characteristics of the mining rights and the requirements for granting ASM permits. In this sense, the Mining Act 2016 can be the vehicle that promotes the full realisation of that contribution. However, small but important specific aspects warrant attention and improvements.

There is **some difficulty with the need to depart from the traditional LSM lifecycle**, represented by the three permits for small-scale operations, which could be simplified into one, granting exploration and exploitation rights simultaneously.

The Act does not link the characteristics of the titles with the viability of the ASM operations to growth. The Mining Act treats the ASM sector as a sub-sector of the mining sector, but does not link the characteristics of the titles designed in the Act with the viability of the ASM operations to support the growth and the progressive capacity to evolve from AM to SSM to LSM operations.

5.1.3. Technical, Safety, and Environmental Challenges

Poor underground methods represent a major constraint to increased ore production and pose a major safety risk. Although more pronounced in areas prone to heavy rainfalls (e.g., Migori), in both gemstone and gold sites, the collapse of weak, unsupported tunnels, flooding of workings, and rock falls pose risks that can cause injury or fatalities or cut off access to ore, which can, in addition to suffocation, cause by poor airflow and lead to closure. Furthermore, ore extraction rates are a major determinant of the overall productivity of ASM activities.

In the case of gold mining, extensive misuse of mercury in the production process leads to serious environmental and human health risks. Mercury emissions are substantial, estimated at over 70 kg per year of mercury emitted from Osiri and more than 1.2 tonnes of mercury lost from all sites in Migori County in the same period. The most severe human health risks relate to the inhalation of mercury during amalgam burning, with risks for gold traders and women who are pregnant or of child-bearing age. The main environmental risks concern mercury 'hotspots' created around gold processing sites and discharge of mercury-cyanide complexes into aquatic systems.

It is also unclear how the operations will extract and process the ore if they cannot use explosives, cyanide, or mercury. The only way to overcome these legal restrictions in the case of mercury and cyanide is to sub-contract the processing of the extracted material or sell the ore to medium or large processing plants. The mines visited by the researchers used mercury. This mercury use can be better managed to prevent health and environmental impacts by using techniques to reduce the amount used, as well as the release of mercury. Many of these methods are simple and low cost, for example, the use of a retort⁹⁸.

The complete elimination of mercury in the ASGM sector can be a long-term goal, but **efforts to implement such stringent measures without viable alternatives (in terms of cost, productivity, access, etc.) may cause significant unintended negative consequences.** In the case of cyanide, the current practice is not to process the ore coming from mercury amalgamation at the mining site, but in small-scale processing plants outside of the mining area that may or may not have the same owners as the mining operations. These processors will be important agents for formalisation and for environmental improvement programming. The restrictions of the use of explosives results in an important limitation for the gold and gemstone operations that will either promote illegal use and will result in the operations not being able to be legalised.

⁹⁷ 259 households were surveyed by the team in Osiri and 401 in Taita Taveta County.

⁹⁸ A retort is a vessel to which heat is applied in order to separate different materials, particularly the mercury from the gold.

Risks to biodiversity through bushmeat hunting and poaching is high, especially in Taita Taveta, given the prevalence of wildlife and high poverty levels faced by some miners in remote camps.

5.1.4. Market Challenges

The lack of formalisation in the gold supply chain is a concern, given the commitment of the government as a member state of the International Conference on the Great Lakes Region (ICGLR) and that Kenyan gold is subject to the Organisation for Economic Co-operation and Development (OECD) Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict Affected and High Risk Areas (DDG)⁹⁹. Total gold production is reported at approximately 3.6 tonnes for 2013, but independent experts estimate ASGM production alone at about 5 metric tonnes per year. For ASM products such as gold (and probably gemstones), only a fraction of cross-border sales is registered as official exports and hence reflected in trade statistics.

Only a small part of Kenyan gemstone production is locally cut and then exported. The cutting industry in Kenya is small and cutting skills have been low for a long period of time. Cut gemstones represent 66% of the official exports. However, this percentage does not reflect the reality of the exports; most the gemstones are likely exported in rough through informal channels. The main reason for cutting is due to the incentive created by a lower royalty (1% vs. 5% for rough stones), confirming that a low royalty is an effective formalisation tool.

The current royalty rates and those proposed, as part of the draft mining regulations, are higher than the current rates for gold or gemstones in neighbouring countries. This difference may constitute a problem because of the potential for smuggling that commonly occurs in these situations, as traders tend to channel their business by smuggling the gold and gemstones toward the lowest royalty rate market to optimise their taxation.

Most artisanally mined gold and gemstones are sold informally. As a result, royalties and taxes are not levied. However, indirect taxes, through workers or owner spending (VAT) or fuel consumption, significantly contribute to the Kenyan budget.

5.1.5. Challenges for Women and Other Vulnerable Groups

Significant gender inequalities in socio-economic status, education, impacts, and benefits are evident in the ASM areas surveyed. For example, in Taita Taveta, approximately one in four women have no formal education, which disadvantages them in comparison to men, of whom one in 10 are not formally educated. Similarly, in communities around Osiri, approximately one in five women have no formal education, twice that of their male counterparts. However, disparity in ownership of assets (e.g., livestock, bicycles, mobile phones) was more pronounced in Taita Taveta, where poverty levels are generally much higher.

Gender disparity extends to the distribution of benefits and negative impacts from ASM. For instance, in Osiri, women comprise 38% of the ASM workforce, yet they yield only 11% of the revenue share. In Taita Taveta, women constitute only 15% of the workforce, most of which involve lower paying jobs in service provision, such as cooking and hauling water. Negative impacts also relate to women and girls' domestic roles, such as in meeting the food security needs of households. Food security can be impacted by land degradation or pollution from mining. Women and girls also care for ill and injured family members, including miners, and for babies and children impacted by mercury in utero. Where women have little recourse concerning decisions that affect them, for instance related to use of proceeds from ASM or sale or use of land, impacts on them may be even more profound. The lack of women's participation in ASM organisations, local government, and other leadership positions additionally play a role in women's disenfranchisement in the ASM sector.

Child labour exists but is much less pronounced in formal, organised ASM sites. This may be related to the owner/investor and worker structure (rather than individual or family unit) production system found in hard rock mines. This may be especially true where vast numbers of disenfranchised, vulnerable young men compete for work and are willing to take on lower paying jobs, which puts them at greater risk for exploitation. In areas where mine sites are family owned and operated, areas are

⁹⁹ Available at <http://www.oecd.org/corporate/mne/mining.htm>.

less formally organised and women participate in high numbers and are abjectly poor, levels of child labour are likely to be higher.

5.2. Recommendations

5.2.1. Formalisation Measures Should Be Implemented

Promote formalisation in the ASGM and gemstone supply chains. Formalisation of ASM and trading of gold and gemstones will bring greater transparency and accountability in the supply chain. The GOK is committed to this, given that Kenya is a member state of the ICGLR and will create the conditions for Kenyan minerals to be compatible with the DDG. One of the main tools for this formalisation is the establishment of economic incentives (e.g., a royalty system) adapted to the circumstances and capacities of the sector, as well as the characteristics of specific minerals.

Strengthen links between government agencies involved in mining and related sectors at national and local government levels, including via coordination and capacity building for local government offices mandated to address environmental, health, gender, and social issues, as well as decentralised officers based on or near ASM sites.

Develop a long-term strategy for formalisation. To better achieve a continuous, coherent and integrated process of formalisation, it is recommended to develop a plan and programme of formalisation and to engage ASM stakeholders in its design and development.

Specific issues requiring inclusion within formalisation process are highlighted below.

5.2.2. The Permitting Design and Administrative Granting Process Could Be Improved

It is not unusual for ASM legal frameworks to need adjustments and improvements. These frameworks are relatively new compared to the traditional mining laws that are based on principles and concepts which have been in a process of improvement for decades, based on promoting large mining operations and pursuing the development of first class (larger and richer) deposits. Most of the proposed recommendations related to the legal framework can be considered as part of the on-going development of the mining regulations, without implying or requiring a change to the Mining Act.

Classification of ASM Operations

The AM permit needs a criterion that is objective and measurable. The annual extraction of material-bearing minerals used for SSM permit is an objective criterion and a good one because it is easy to evaluate by mining specialists (inspectors) and indirectly restricts the technology and investments without needing to introduce additional criteria. However, the amount of material allowed may need to be more carefully balanced. Currently the amount for the SSM permits may pose some avoidable and problematic restrictions, particularly if the objective of the public policy is to promote the development of small-scale operations. This means that if the AM permit adopts the criterion above, the thresholds should allow for progressive scaling up from an AM permit to an SSM permit and from that to an LSM licence.

The investment criterion should be revised. The Act defines another objective criterion for the SSM permit, which is for investment. It states that the amounts will be determined in the mining regulations. This additional criterion is not necessary because the capacity of the extraction of material bearing minerals will indirectly limit the investment that is viable for an operation. However, the criterion is important if the reconnaissance and prospecting permits are maintained. In this case, it is important to introduce a classification criterion to fill the existing legal gap. The only objective criterion that can be used in these two phases of the mining cycle is the amount of investment.

Technology limitations should be carefully evaluated based on the consequences of the barriers regarding the use of cyanide, mercury, and explosives. International experience shows that obstacles to using these technologies prevents operations from becoming legalised and yet, in practical terms, does not prevent their use. Additionally, it excludes the possibility of any programme of capacity building that eventually could be part of the support to the miners to improve the use of these substances and of the introduction of technical methods that could minimise or eliminate the safety

and health risks and environmental impacts. The restrictions on mechanisation for the mining permit is defined in very absolute terms, which may need to be evaluated if the objective is to promote the improvement of the methods and techniques and the working conditions of the operations. Mechanisation could be allowed if the operation does not exceed the amount of extraction defined in the Act.

Types and Characteristics of the ASM Permits

Four permits are defined to give support to the attribution of mining rights for ASM. There is one permit for AM operations and three permits for SSM operations. The permits for small-scale operations are for reconnaissance, prospecting, and mining permits.

It is recommended that, based on the characteristics of the SSM operations, the right to reconnaissance and prospect be given as part of the mining licence where Kenyans are the owners of the corporate body. In the case of foreign capital, including when they are in the minority, this recommendation does not apply. In this case, the separate reconnaissance and prospecting licences should be maintained.

Relations between mining operator(s) and titleholder(s) need to be regulated. When the permits are granted to a natural person, it is important that the relationship between the operator(s) and the titleholder be based on an operation contract, with rights and obligation for both parties. In order to promote balanced contracts (in terms of rights and obligations) the contract should require approval by the mining authorities and the law should define the minimum requirements of the contract, which could be achieved through different regulatory formats (e.g., simple model contracts or minimum content). The operator(s) also need to have simple but formal contracts with his/her work force (miners). It is recommended that these contracts be available to the authorities for audit.

A definition of designated and non-designated areas is necessary to better understand the concept of the permit area and there should be clarification of the relation between designated areas and SSM permits, including for AM permits.

Consider extending the size of the area of SSM permits (within parameters consistent with ASM methods and mineralisation) to promote the viability and stability of the SSM operations. This issue needs further study to address the particular limitations posed by the current restrictions.

Consider allowing successive permit renewals for AM permit and SSM permit for continuation of mining operations until the mineral resources have been exhausted (for ASM operations, exhaustion does not necessarily mean all mineral resources, rather those that the operation has the technical capacity to extract with technology economically available to them). The AM permit has a duration of a maximum of three years and may only be renewed once for the same period. The reason for this limitation on the number of allowable renewals is unclear. If the area still has mineral reserves, it would make more economic sense to allow the continuation of the operation until the deposit has been fully exploited.

Consider clarifying the exclusivity right to perform prospecting activities and exploitation activities in the prospecting permit, SSM permit and AM permit. The clarification also needs to address the situation of designated areas based on the relation between these areas and permits. Granting exclusivity rights with these permits is recommended.

Consider clarifying the rights of transfer and upgrade for the prospecting permit, SSM permit, and AM permit. For the AM permit, the right to upgrade is already granted, but for the SSM permit it is unclear. If this right becomes part of the characteristics of the SSM permit, the process and requirements for the upgrade need to be defined. If the right to transfer the permit is granted, a distinction between designated and non-designated areas needs to be taken into consideration.

Ensure that the Mining Act's approach is reflected in the mining regulations. The Act is clear about the different requirements for obtaining ASM permits. It is a simple process and progressive (as more rights are attributed, there are more obligations). It will be important that the draft mining regulations follow the same approach to specific obligations and instruments that are part of those requirements.

Requirement of the Permits

The legal treatment of corporate bodies that are candidates for small-scale permits needs to be clarified in terms of the requirements for permit attribution, specifically regarding the distinctions between those that are only comprised of Kenyan shareholders or partners and those that are not. The rationale for the differentiation between SSM operations involving exclusively nationals and those with minority foreign capital is that it allows for the distinction of different rights and obligations for the permits.

Ensure that the benefit sharing agreements between ASM and communities are in fact different in their terms and conditions from those of LSM. The subject of community land and mineral rights is an important and sensitive one and a difficult area to give specific recommendations without a broader discussion on the correct solutions that respect the interests of both sides. In general, the way that the ASM sector addresses this matter is to give compensation throughout the life of the project, based on an agreed percentage of the production. This approach is very different from LSM, where compensation is often a one-time payment in the earlier phases of the mining project, except where the law defines an obligation for impacts and benefits contracts, which tend to be for the life of the project. This means that the kind of agreements that are expected to be negotiated between the communities and the candidate of the mineral right for the ASM sector are in fact different in their terms and conditions from those of LSM. This difference does not mean fewer benefits for the communities, but it does mean that the way the benefits are realised is different and that the content of those contracts is also distinct from LSM. This aspect should be taken into consideration by the authorities responsible for enforcing and managing these contracts with the objective of balancing the relationship between the candidate of the title and the community.

Aspects of community land consent need to be carefully balanced. The other aspect related to community land and mining that needs further clarification is the consent of the authority that administers and manages community land in the case of registered community land and in the case of unregistered community land where the consent comes from National Land Commission. Essentially, the issue is whether consent represents another licence and if it includes a veto power. The way that consent will be addressed in the mining regulations will bring clarity regarding the separation between surface and sub-surface properties in relation to the issue of consent.

Royalty rates need to be at balance with economic incentives for formalisation and harmonisation with neighbouring countries. Royalties are part of the requirement for the SSM permit, after the granting of the permit. The royalties are important and, depending on how they are regulated, can either promote or inhibit legalisation of the ASM sector. If not well calibrated, they can enable smuggling, particularly for gold and gemstones, both of which are easy to transport and difficult to control. The control needs to be indirect, particularly through economic incentives, so that gemstones and gold are used and processed by the domestic market or/and exported by legal routes. The benefits of using legal routes should be greater and the costs less than to use the illegal ones. The rate of the royalty that applies for ASM operations also plays an important role in this approach. The recommendation is for ASM permits to have different royalty rates between the AM permit and mining permit so as not to create barriers for legalisation. The rates for gold and gemstones should be particularly low and not more than the neighbouring countries. Harmonisation of royalties between neighbouring countries is recommended, despite the difficulty that inter-governmental negotiations represent in some cases. However, if these negotiations are viable, care still needs to be applied in setting royalty rates for the ASM sector with the objective of having harmonised rates that are feasible for the sector and do not create a disincentive for the legalisation of the operations and the legal trade routes.

Lower the royalty rate to attract ASGM into the formal sector. The challenge for the country is to formalise the sector. If formalisation starts through trade, it will allow the government to understand the volumes produced whilst acting on the ground with formalisation plan and programme. At present, no ASGM is subject to royalties, given that all the ASM is smuggled out of the country. Setting an adequate rate of lower than 2% could quickly attract some volume to the formal sector when the conditions are still competitive, versus informal exports. The royalty payment should be transferred from the producer to exporter or final trader.

Alternative best practice option: exempt ASM from royalty payments. In ASM legal frameworks there is a trend to apply special rates for ASM operations. Many countries either exempt ASM from

paying royalties or create special rates according to the licensee's ability to pay. The key principle is that there should be a financial incentive built into the structure of the royalties for ASM. Furthermore, the cost of administering and collecting royalty payments on these operations is often higher than the economic benefits¹⁰⁰.

Use economic incentives to formalise ASM miners' and processors' activities. A small flat income tax also could be introduced (0.5–1.0%) and levied together with the royalty that could be deducted at the time of export or final sale. Even a social contribution levy could be implemented and levied together with the royalties and income tax. Each mineworker could have a fiscal and/or social identification number that will be indicated at time of sale to authorised traders. Final traders, the exporters will have the responsibility to pay this collected flat income tax and contribution to the government. However, total taxes and contributions levied should not exceed 2%.

5.2.3. OHS and Efficient Extraction and Processing Training is Needed

Production can be substantially increased through introduction of and training in appropriate technologies downstream of ore extraction. Current methods in gold mining can be improved using simple improvements to the system whilst addressing concerns related to mercury misuse, whilst improvements to gemstone handling, valuation, and cutting and polishing would increase local economic benefits.

Specific training is needed in a range of critical topics ASM of both gold and gemstones, from underground risk identification and timbering to mining methods (rock breaking, hoisting systems) to basic mine planning and OHS systems (e.g., communication, incident management) to improved processing and downstream methods, ideally coupled with mechanisms for financing basic improvements and more advanced technical support.

- In the case of **gold processing**, measures are urgently needed to minimise, manage, and mitigate risks from mercury misuse, including gender-sensitive approaches. Suitable technical responses to minimise mercury use and improve its handling and management, including sensitisation campaigns, coupled with the introduction of retorts, more efficient gravity separation methods and waste containment systems.
- **Health and safety training programmes** should be established at mine sites on mining techniques to avoid the collapse of tunnels and shafts and strengthen shaft ventilation and design. Those programmes should sensitise workers to the dangers of dust exposure in ore processing.
- In the case of **gold processing**, an emphasis on the improved use of screens, optimisation of crushing time (manual or in mills), the introduction of simple crushers, and the introduction of alternative gravity concentration methods should be prioritised, alongside efforts to minimise mercury use and its effects (below) and related personal protection measures.
- In the case of **gemstone mining**, training is needed in sorting, grading, and the valuation of gemstones, with additional assistance to expand to gemstone cutting and polishing.

Disseminate emerging best practices on a range of social and economic approaches, including financing models, efforts to tackle gender inequalities, and youth vulnerability and child labour. Sources include materials generated under the Global Mercury Partnership (GMP), Fairmined Gold Programme and via links with the Fairtrade Gold projects located in Migori, and work carried out by the Gemmological Institute of America (GIA), UN Women, and others.

5.2.4. Gender Inclusion Is Essential

Prioritise women's participation and training, including within formalisation efforts, to address gender inequalities at ASM sites. This training could include sensitisation and training programmes and the establishment of basic, simple organisational policies, codes of conduct, and rules (environmental, occupational and labour related) with gender mainstreamed throughout. The training could help address a multitude of issues identified herein, including rights issues of workers related to SGBV, gender inequalities, and exploitation of vulnerable groups.

¹⁰⁰ Otto et al. 2006

Potentially negative gender impacts of new technologies and methods must be considered and mitigated. The introduction of mechanised or improved methods, including those proposed above, can render much of women’s work at mines obsolete, resulting in even greater gender disparity in terms of the distribution of benefits. A gender impact analysis of proposed technical interventions and targeted, preferential training of women in any new methods must be coupled with efforts to counter discriminatory beliefs and challenge barriers to women’s access to different jobs.

Prioritise the participation of women and youth in training, including within formalisation efforts. Topics should address inequalities including via leadership and advocacy training, business skills and entrepreneurship development, the latter of which may require support for basic literacy and numeracy. Piloting the establishment of ‘mining desks’ in local women’s trust banks, which currently see loans to miners as a high-risk venture, and creation of savings groups (e.g., SACCOs) have been shown to effectively support empowerment of women in ASM areas.

5.2.5. Gemstone-Specific Recommendations

For Taita Taveta and the Kenyan gemstone sector the specific recommendations are as follows.

Establish a free trade zone market for gemstones. Gemstones are the easiest commodity to smuggle. Their value to volume or weight ratio is one of the highest smuggling incentives if fiscal, exchange control, or due diligence barriers are not in place. In order to formalise the trading and exporting of gemstones, tax incentives must be in place. A free trade zone around the sector could amend this distortion.

- Taxation should be removed or set to a low ‘carat tax’, taxing gemstones on a weight basis independently from their commercial value.
- A business-friendly environment would also allow a competitive cutting industry. Employment should be incentivised, taxation should be low to zero for value-adding processes, and investment procedures should be eased for nationals and foreign investors. This will create a reliable sector and attract international buyers and investors.
- The tax exemption should be extended to income taxes and a competitive social security contribution system should be introduced to attract investors in the cutting and trading sector.

Establish a strong gemstone cutting industry. To add value locally to gemstones, cutting must take place in the country. It is necessary to adopt the latest design trends and cutting techniques. To do so, capacity building programmes with international technical support should be put in place. Incentives to women also can be introduced because cutting can be equally performed by men or women.

Establish a gemstone centre. Half of the value of gemstones is captured by the traders. If part of this value can be transferred to the extractive sub-sector or better prices can be obtained, then indirectly, through miners’ consumption, tax contribution to the budget will increase. The researchers estimated the current VAT contribution of the Taita Taveta County miners to be USD 1.6 million.

- A gemstone centre, where international buyers could buy or where miners or miners’ organisations could consult various buyers at the same time, would foster competition and finally allow better valuation and balanced distribution of the revenues. This centre could also serve as a training centre for cutters and even a cutting centre.
- Such a centre can only be a success if set as a free zone and coupled with a zero royalty or competitive carat tax. If the centre’s activities are taxed, no gemstones will be traded; stakeholders will prefer staying in the informal markets.
- Further study needs to be performed to determine if Voi is the best place to establish the centre or if Nairobi is preferred given its international connections.

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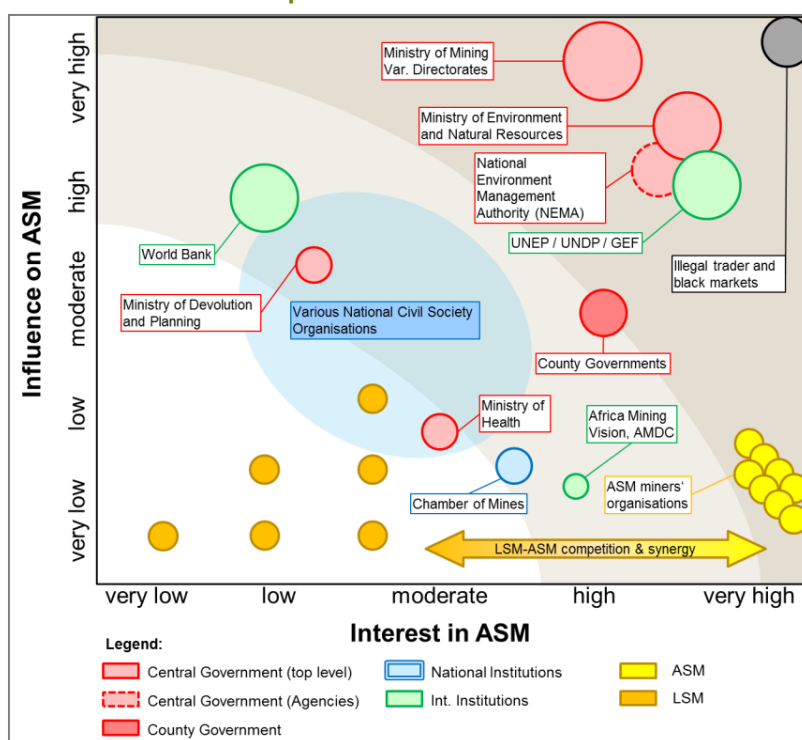
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Annex 2: Stakeholder Analysis

This annex describes a sample of stakeholders relevant for the ASM sector in Kenya. The list is not intended as a comprehensive stakeholder mapping exercise, but as an indicative documentation of findings from the field missions to Kenya. It still allows for a comprehensive understanding of the institutional context, identifying interest, and influence on ASM by representative stakeholder groups (Figure A24)

In general, key governmental institutions, such as MOM and MENR are characterised by a high interest in sustainable ASM and have high levels of influence. Development partners (multi-lateral and bilateral organisations, NGOs) in turn demonstrate a generally moderate interest in ASM and have moderate level of influence. An anticipated exception with high interest and influence will be GEF GOLD. The private sector's position is in general characterised by low interest and influence, with some possible exceptions. CBOs of miners have implicitly very high interest, but unfortunately very low influence. This rough, indicative appreciation based a few brief meetings with stakeholders during the short field missions is illustrated in the stakeholder map in Figure A1 and described in greater detail in the sections below.

Figure A24: Indicative Stakeholder Map



A2.1. Central Government

A number of key government agencies have significant influence on establishing sustainable ASM, but with variable interest, as demonstrated by levels of action or prioritisation of ASM related issues.

A2.1.1. Ministry of Mining

The primary government authority in Kenya's mining sector is the MOM, which provides policy direction for the minerals sector and oversees and provides guidance to its underlying departments, units and directorates. The current Mining Act is considered an advance in creating a legal framework for the sector and symbolises the political support that ASM is now receiving from the MOM. The overall mandate of the Ministry is to oversee the mineral sector in Kenya, but more specifically to:

- Oversee the exploration of minerals
- Oversee the development of the mining sector
- Oversee and set mining policies and the management of resources

- Oversee and map current resources available in Kenya
- Set general policy for the industry
- Set standards for health and safety in mines
- Maintain accurate and current geological data

The following directorates are mandated and/or are particularly well placed to support the progress of ASM in the country:

- **Policy, Strategy, Research, Legal, and Capacity Building Agency**, which aids in the elaboration of sectoral policy, advises on legal matters, consolidates and develops sectoral strategies, and conducts the requisite research to make informed decisions and develop appropriate monitoring and evaluation frameworks
- **Directorate of Mineral Management and Regulations**, whose mandate includes review and approval, refusal, renewal, and cancellation of concessions and maintenance of the mineral licence cadastre
- **Directorate of Mineral Promotion and Value Addition**, which, particularly with respect to gemstones, is well-positioned to support downstream value addition
- **Directorate of Mine Health, Safety and Environment**, which is well positioned to play both an inspection and enforcement as well as support roles

Other applicable directorates of the MOM include:

- Directorate of Geological Surveys
- Directorate of Resource Surveys and Remote Sensing
- Directorate of Corporate Affairs
- Geo-Data Centre and Minerals Certification Laboratory
- Mineral Audit Agency

A2.1.2. Other Ministries

Given that challenges in ASM span multiple issues, from occupational and community health to water and environment to access to information and financing, multiple government agencies have key roles to play. Some are described below.

Ministry of Environment and Natural Resources (MENR)

MENR sees that mercury is a problem and represents a cost (in terms of health and environment) for the country. At the moment there is no effective control, nor is there information related with evaluating of the costs. Furthermore, because of the imminent ratification of Kenya of the Minamata Convention on Mercury, the export of goods (food and fish) will start to be monitored and this can represent a cost for the country.

The **National Environment Management Authority (NEMA)** is an agency of the MENR responsible for the attribution of environmental licences and the inspection of ASM activities. NEMA's capacity is very limited in relation to its mandate and coordination with the MOM is sporadic (at the moment a programme is in place related with environmental governance in the mining sector, but the focus is LSM). However, they know very much more about construction materials impacts and they expressed some concerns related to the sector, but also some understanding of the social importance of ASM.

Ministry of Devolution and Planning (MDP)

MDP integrates all work plans and budgets, including those related to ASM vetted by MOM and other ministries, into the national master plans, as required to obtain requisite financing.

Others

Ministry of Health, Ministry of Labour and East African Affairs, Ministry of Industrialization and Enterprise Development, and Ministry of Public Service, Youth and Gender Affairs all have important roles in the process of formalisation.

A2.2. County Government

The Constitution of Kenya (2010) marked a massive step in devolution of powers, in particular though resources and functions allocated to a new level of government at county level. As such, multiple line officers of key ministries, including health, environment, and mining, are decentralised to county government level and, given their proximity to ASM sites, are much better placed to address multiple issues. However, this process of devolution is quite recent, and challenges in terms of human and financial resources pose constraints. Furthermore, recognition of ASM as a priority by non-mining agencies and officers calls for increased awareness and improved coordination in planning, budgeting and implementation.

A2.2.1. Taita Taveta County Government

The local government has promoted formalisation of miners into associations. Learning the specifics of that experience could be very valuable for the future process of ASM formalisation in Kenya, including for the current mining licence reforms. The Taita Taveta county government is supporting the ASM sector, and several initiatives and partnerships started to emerge between different stakeholders (e.g., Taita Taveta University College with local and national government to bring financial support for equipment to the miners). Additionally they are establishing a KES 50 million (USD 0.5 million) gemology centre in Voi town to add value to the gems and to train the miners in practices and technologies that can potentially reduce the environmental damage associated with the mining operations).

A2.2.2. Migori County Government

In Migori County, the following representatives of the institutions attended meetings at our invitation (number of people in parentheses). From these institutions, the Ministry of Environment expressed strong interest in the issues related to ASM, although its view is somewhat negative towards ASM, but not in opposition.

- Ministry of Interior – national (1)
- Ministry of Mining – national (1)
- MICODEPRO – SACCO (1)
- County government (1)
- NEMA (1)
- Ministry of Education – county (1)
- Ministry of Lands (1)
- Ministry of Environment – county (7)

A2.3. Private Sector Actors and Organisations

- **Artisanal and small-scale miners.** Described in this report
- **Kenyan industrial mining companies** (medium and large scale)
- The **Kenya Chamber of Mines** was formed in 2000 to represent the interests of mining and exploration companies, miners and traders to government, whilst playing an investment promotion role for the country. Recent contributions include input into Kenya's Mining Investment Roadmap and draft Mining Policy and support for the annual Kenya Mining Forum. The Chamber has 100 members. Some of these are ASM operators and traders. Other counties have similar chambers, but these are not related to the Kenya Chamber of Mines from Nairobi.
- **CBOs:** In terms of key private sector organisations, in response to expectations of formalisation, artisanal miners are increasingly forming local CBOs as a means to consolidate their resources to achieve shared aims, including that required to obtain licences for their activities. Examples are:
 - **CMA**, which was formed with the main objective of bringing together small scale miners in Chawia Ward/Taita Taveta.
 - **MiCoDePro** in Migori
- **National Artisanal and Small Scale Miners' Forum**
- **Kenya Miners Cooperative Society**
- **Rafiki Microfinance Bank** is a microfinance institution, the first to be owned by a commercial bank in the Kenyan market. It was conceived by Chase Group in 2009 and subsequently began operations in 2011.

A2.4. National Civil Society Organisations

Particularly with rapid progress in the petroleum sector and following a number of well-publicised conflicts in the minerals sector, a number of civil society organisations (CSOs) and NGOs have emerged. Focused a range of priorities topics including human rights, gender, and environment, CSO initiatives include research, action, and intervention at local and national levels. Examples include:

- **Community Action for Nature Conservation (CANCO)** (active in the National ASM Forum founding conversation) is an environmental NGO in Kenya registered in 2008. CANCO was initiated by a team of multi-disciplinary professionals and practitioners aiming to contribute to good environmental governance and public interest in sustainable management of natural resources whilst promoting widespread responsible and sustainable development in Kenya. Mining is part of one of the four thematic programme areas. Using a variety of effective community and stakeholder engagement approaches, CANCO emphasises mobilising and galvanising community voices and actions for policy influence and engagement and building resource-specific community networks and alliances for knowledge-sharing and promotion of constructive dialogue.
- **Natural Resources Alliance of Kenya (KENRA)** is an alliance of Kenyan CSOs that deal with natural resources issues. KENRA was formed from an initiative of International Alliance on Natural Resources in Africa (IANRA), whose main objective is to address several issues touching on natural resources in Kenya. The nine members of KENRA **come** from various parts in Kenya and comprise Coast Rights Forum, ActionAid Kenya, Ngua Mlambo Development Trust, LICODEP, ILISHE Trust, Ngoma Trust, OAID Kenya, Homa Hills Community Development Organisation, and Malindi Rights Forum. The member-groups/organisations have been instrumental in spearheading formative activities and designing a structure in which subsequent potential CSOs currently not involved could fit in.
- **Thamani Trust:** Founded in 2011 (formally registered in 2012), it is the charitable arm of Thamani Gems and addresses issues impacting communities in areas with active mineral extraction activities.
- **Law Society of Kenya:** It is Kenya's premier bar association, with membership of all practising advocates, currently numbering in excess of 13,000. It has the mandate to advise and assist members of the legal profession, the government, and the larger public in all matters relating to the administration of justice in Kenya.
- **Women in mining associations**
- **Kenya Institute for Public Policy Research and Analysis (KIPPRA):** This is an autonomous public institute that was established in May 1997. It conducts research and analysis and provides advisory on public policy issues with the goal of providing advice to policy makers. Although ASM is not a main issue, KIPPRA has shown strong interest in working in this area in the future.

A2.5. Academic Institutions

Taita Taveta University College: Located in Taita Taveta County, this university is a hub for research and teaching of mining and mineral engineering. The Mining and Mineral Processing Engineering Department provides training and research in the fields of mining and minerals engineering.

A2.6. Multi-Lateral and Inter-Governmental Organisations Involved in ASM-Related Activities¹⁰¹

A2.6.1. ICGLR Secretariat

The main role of the Secretariat with respect to natural resources is to support the implementation of the 2010 ICGLR Regional Initiative against the Illegal Exploitation of Natural Resources (RINR). The Secretariat's mandate includes:

- Support to 11 member states to establish and adopt the Regional Certification Mechanisms (RCM), which provides a DDG-compliant basis for tin, tungsten, and tantalum certification for member states
- Establishment of a regional database on mineral flows
- Guidance provided on formalisation of ASM
- Create an Extractive Industries Transparency Initiative (EITI) peer learning mechanism
- Establish a whistle-blowing mechanism.

GiZ supported development of ICGLR Guidelines on Mainstreaming Gender in the Minerals Sector to support compliance with Article 16 of the 2011 Kampala Declaration, which commits all ICGLR Member States to mainstream gender in its natural resources sector policies, including that governing the minerals sector.

A2.6.2. Africa Mining Vision (AMV) and African Minerals Development Center (AMDC)

In response to widespread discontent that Africa's vast mineral wealth has not translated into broader growth and development, the African Union (AU) Heads of State and Government endorsed the AMV and establishment of the AMDC to provide strategic guidance and support development of country and continental visions and action plans.

A2.6.3. UNEP/UNDP/GEF

Between 2010 and 2013, the international community finalised the Minamata Convention on mercury, an internationally legally binding instrument aiming at reducing anthropogenic emissions of mercury to the environment. The Minamata Convention addresses issues of mercury supply, uses and emissions, providing the framework for countries to take coordinated actions to reduce the concentration of this toxic metal in the environment. ASGM is directly addressed by the Convention in Article 7, which requires countries to take steps to reduce the use of mercury by the sector and, if countries recognise the issue as more than insignificant, require the development and implementation of a National Action Plan, according to the requirements of Annex C. The National Action Plan must stipulate actions to eliminate the four worst practices, and the actions must be implemented in order for the Party to be in compliance with the Minamata Convention. The four worst practices as specified in Annex C are:

- Whole ore amalgamation
- Open burning of amalgam
- Roasting of amalgam in residential areas
- Cyanide leaching of mercury-treated tailings (cyanide has been found to react with mercury, making it soluble and therefore more mobile)

In support of the implementation of the Minamata Convention, the Global Environmental Facility (GEF) Programme Global Opportunities for Long-term Development of ASGM Sector (GEF GOLD) is in preparation, with UNEP as the lead GEF agency. The programme aims to reduce the use of mercury in

¹⁰¹ Please note that the World Bank currently does not support a major minerals sector lending project in Kenya.

the ASGM sector in the participating countries by facilitating the access to finance for artisanal miners and mining communities for the introduction of low and non-mercury technologies and techniques and by developing sustainable ASGM supply chains.

Kenya has signed the Minamata Convention on 8 June 2015 and the preparation of the National Action Plan is on-going with support of UNEP. It is envisaged that Kenya will participate in GEF GOLD, eventually in partnership with UNDP as implementing agency.

A2.8.4. UN Women

UN Women (particularly via the East and Southern Africa Office in Nairobi) has taken on gender and extractives as a priority theme. In addition to current efforts to develop short courses on gender and extractives, UN Women annually sponsors a Regional Gender Sharefair focused on extractives in Nairobi and is currently exploring project entry points in the region.

A2.6.5. Extractive Industries Transparency Initiative (EITI)

EITI was created in 2002 as a voluntary global standard to promote the open and accountable management of extractive resources. It seeks to address the key governance issues in the oil, gas, and mining sectors. Kenya is not a member country of this initiative. In mid 2015, Kenya and the U.S. made an official statement committing Kenya to enter the EITI.

The Government of Kenya commits to implementing the Extractive Industries Transparency Initiative (EITI) domestically and to identifying and enabling an EITI implementation focal point within the government within six months. The Government of Kenya also commits to adopt and implement a progressive and transparent policy and legislative framework for upstream, mid-stream, and downstream extractive activities, including transparency in licensing procedures, publication of contracts, and environmental and conservation and labour requirements in line with international standards¹⁰².

A2.7. Bilateral Governmental Organisations Funding ASM-Related Projects

GIZ and BGR

GIZ has been the main supporter of the ICGLR Secretariat and advancement of the ICGLR pillars under RINR. The German Federal Institute for Geosciences and Natural Resource (BGR) developed the Certified Trading Chains approach for fingerprinting Coltan ores from the Great Lakes Region (GLR) and implements ASM-relevant projects in the Democratic Republic of Congo and Rwanda.

DFID

DFID Kenya maintains several projects that are largely focused on improving health, education quality, private sector growth, and local resilience. With respect to extractives, DFID's East Africa Research Hub (EARH) has offices in Nairobi (along with elsewhere in East Africa) and issued this project's TOR. In addition, DFID Kenya's Extractives Programme (K-EXPRO) runs from 2015 to 2020 and aims to improve Kenya's private investment environment in Kenya's mining and petroleum sectors, improve governance of mineral revenues, increase competitiveness of local content providers, improve employability of local workers, and overall enhance local benefits to extractive sector host communities.

A2.8. International NGOs Involved in ASM-Related Projects

A2.8.1. Diakonia

Diakonia is a faith-based Swedish development organisation that supports and works with around 400 local partner organisations in about 30 countries. In Kenya, Diakonia co-operates with a variety of local

¹⁰² KENYA, R.O. 2015 b

and national NGOs, along the thematic areas of governance and democracy, human rights, food security, and gender equality. Together with their partner organisations, they raise awareness among citizens about their rights and responsibilities and mobilise the populations for action and influence around common interests. In the mining sector they have performed industry assessments to raise the major pressing issues.

A2.8.3. Fairtrade Africa

Fairtrade Africa is a membership organisation representing certified producers and workers in Africa. It is part of the larger Fairtrade movement that makes up the world's largest fair trade system. In partnership with the Alliance for Responsible Mining (ARM; from 2009 to 2012), Fairtrade developed a Standard for Responsible Gold from ASM, which evolved into the current Fairmined Standard and the Fairtrade Standard for ASGM after the partnership came to an end. During the time of the partnership, ARM and Fairmined planned a three-year project to certify small-scale gold miners in Kenya, Uganda, and Tanzania. This project is now implemented by Fairtrade and aims to empower miners to build sustainable businesses that enhance the socio-economic and environmental well-being of miners and their communities. Eight mining organisations across the three countries are involved in the project. In Kenya, the beneficiaries include Lolgorian ASMO Group Kenya in Transmara and Micodepro Development Group in Migori.

A2.8.4. Pact

Pact is a non-profit international development organisation founded in 1971. Pact works on the ground with initiatives and local organisations in nearly 40 countries to ensure that all people are heard, capable, and vibrant. In Kenya, Pact works with cross-cutting approaches in governance and capacity development and democratic reforms advocated by Kenyan NGOs, leading to peace along the country's borders with Somalia, South Sudan, Ethiopia, and Uganda. Recently, Pact began working with lead partner Management Sciences for Health and eight national CSOs to offer communities improved access to health care. Based on Rwanda's Pact projects and experiences with the mining sector, particularly in the ASM sector, Pact in Kenya started to work on projects that directly focus on the mining sector, with this project being one example.

A2.8.5. ARM

Since 2004, ARM has worked globally with a worldwide network of experts and partners for sustainable development of ASM. ARM's mission is to transform the ASM sector through a holistic support strategy, a bottom-up approach, and incentives for ASM to become a formalised, organised, and profitable activity that is socially and environmentally sustainable. The Fairmined standard, a third-party certification system that ensures that miners formalise whilst meeting standard for responsible practices, is one of central initiatives towards achieving ARM's mission.

ARM works in 14 countries in Latin America, Africa, and Asia. The organisation has already supported around 100 mining organisations to improve their mining practices and better plan the productive and conservation strategies in mining communities. ARM carries out extensive advocacy, policy, and legal reform work promoting responsible ASM in national and international spaces. ARM already has several projects in West Africa, but it is looking to expand its reach in the continent, particularly in East Africa, to work on projects like this one.

Annex 3: Comments on Specific Legal Aspects

This annex extends the analysis of legal aspects in section 2.2.3. In particular, it elaborates in more depth on the characteristics of the ASM permits and the requirements for permits attribution.

Table A2 below identifies the main characteristics of ASM permits.

Table A2: Characteristics of the ASM permits¹⁰³

Type of operation	Type of permit	Eligibility	Area (maximum)	Duration (maximum)	Renew (maximum)	Exclusivity	Upgrade	Transfer
Artisanal Operation	Artisanal mining permit	<ul style="list-style-type: none"> A citizen of Kenya and may be a member of an AM cooperative association or group, OR A corporate body where no less than sixty per cent of the shareholding is held by citizens of Kenya 	Designated and non-designated areas Size of the area is not defined	3 years	3 years only once	Not clear	Yes	Not clear
Small- Scale operations	Reconnaissance permit Note that this phase is not obligatory	Not defined but possibly the same eligibility as the other small-scale permits	Area specified in the permit	Not defined (2 years for LSM)	Not defined (LSM is no)	No	Not clear	No
	Prospecting permit	<ul style="list-style-type: none"> A citizen of Kenya OR A corporate body, where no less than sixty per cent of the shareholding is held by citizens of Kenya 	25 contiguous blocks (~ 506 ha)	5 years	5 years once	Not clear	Not clear	Not clear
	Mining permit	<ul style="list-style-type: none"> A citizen of Kenya OR A corporate body, where no less than sixty per cent of the shareholding is held by citizens of Kenya 	Designated and non-designated areas 2 contiguous blocks (~ 40.5 ha)	5 years	5 year (unclear how many times)	Yes	Not clear	Not clear

¹⁰³ Republic of Kenya. The Mining Act (2016). Op. cit.

A3.1. Eligibility for ASM Titles

A Kenyan individual and corporate body can be eligible to apply for an AM permit and small-scale permits. The corporate body can be wholly owned by Kenyans or not, and in this case no less than 60% of the shareholding should be held by citizens of Kenya.

Several aspects are important to highlight here. The law is open to foreign capital in ASM operations, but took some precautions that are positive, in terms of the structure of the capital of the companies, imposing a requirement for majority of ownership by citizens of Kenya and in terms of different requirements that will be analysed further along in this section of the report.

Currently the tendency is to reserve ASM sector for national capital because the sums required for ASM operations tend to be available nationally (in contrast to large-scale operations). The other reason is that ASM is an activity in which the less advantaged part of the population can engage and because of this the sector is an important contributor to poverty alleviation and a vast source of employment in the rural areas. LSM operations also play an important role in the economy in terms of attracting a significant amount of foreign direct investment, exports, and government revenue. The introduction of foreign capital into the ASM sector can be problematic at different levels in terms of fulfilling these development objectives and potentially can create distortions in terms of the characteristics of the mining sector in the country¹⁰⁴.

Another consequence of the introduction of foreign capital in ASM is that the regulatory framework tends to become more restrictive in its definition of ASM sector and in the rights and obligations for its permits because of the fear of having LSM operations camouflaged as ASM operations.

The Act took some precaution in terms of distinguishing the requirements for the small-scale permits when the company is not totally owned by Kenyans. An analysis of this matter is provided below in this part of the report.

The other aspect that deserves some consideration is the eligibility of ASM permit for a natural person, in which case it only applies to Kenyan citizens. This kind of eligibility will promote an economic model in which the holder of the mineral right is not the one that is performing exploration or exploitation activities. This in turn can be problematic if the relation between the titleholder and sub-contractor(s) is not legalised and controlled by the government.

The Mining Act is ambiguous about the relationship between the permit holder and ASM operation in disposition 11, when it treats as synonymous a natural person holder of the permit, and artisanal or small-scale operations wholly owned by Kenyans (see below).

11. Acquisition of rights in minerals:
 (1) A mineral right may be granted to or be held by a person (natural) who –
 (...)
 (d) has the required technical capacity, expertise, experience and financial resources, however this shall not be a requirement for artisanal and small-scale mining operations wholly owned by Kenyans;
 (...)

In the definitions section and disposition 70 of the Act, it mentions having mines support (in the sense of contracted mining services for ASM operations) and defines that a licence should be issued for this support (i.e., sub-contractor).

In the definitions:
 'mines support' means—
 (a) contract mining services which include top soil and waste removal, drilling and blasting, excavating and haulage of ore to plant on a turnkey basis;
 (b) assay laboratory services;
 (c) drilling and blasting services;
 (d) mineral exploration services for a holder of a mineral right;

¹⁰⁴ UNECA 2002

(e) contract mining services for small scale and artisanal mining, which include mining and processing of ore, reclamation, re-vegetation and management of mining operations;

(f) any other services specifically and exclusively related to mining, which the Cabinet Secretary considers necessary for the effective and sustainable development of the mining industry;

In part X, 'Dealings in Minerals', it defines mine support as:

70. (1) A person or company shall provide any mine support services subject to being issued with a licence by the Cabinet Secretary, upon recommendation of the Mineral Rights Board.

(2) The Cabinet Secretary shall prescribe regulations to give effect to this section.

However, the definition of mine support does not contemplate the situation when the sub-contractors are the ASM miners; when they are the providers of the services (e.g., mining, processing of ore, reclamation, re-vegetation or management of mining operations).

The solution for the licence mentioned in section 70 could also be an interesting option to provide support for ASM operations when they are in the position of sub-contractors (mine support services).

Different persons are eligible to be granted ASM permits, from a Kenyan natural person to corporate persons (companies, cooperatives, etc.). Providing this diversity of legal umbrellas for ASM operation is very important because it promotes diversity of economic arrangements with legal status. When the Law forces one specific legal body (e.g., cooperatives) very often, the economic actors create them on paper to meet the Law, but in practice they just maintain those economic relations that are viable between the different economic actors in a particular situation¹⁰⁵.

ASM cooperatives in Brazil: One paradigmatic example is Brazil, when the Constitution of 1988 gave priority to cooperatives to be the legal umbrella of ASM operations and the subsequent Law that regulates the sector elected the cooperatives as the only legal person illegible for ASM permits (Permissão de lavra garimpeira). The consequence was that the majority of the ASM cooperatives are a fiction because the actual economic relations of the ASM operations are based on employee and employer relations. The consequence was that the miners continued in informality, but the cooperatives are considered legal because they are the holder of the mining title.

A3.1.1. ASM Permit Area

The Mining Act defines two categories of areas for AM permits and mining permits: designated and non-designated areas. The Law does not have a definition for a designated area but it seems that it can be interpreted as an area with mineral potential identified and created by the government, which is exclusively for ASM activities. The non-designated areas are those that can be requested by the permit applicant, but which must be free of other mineral rights or any legal restrictions to perform mining activities. The reconnaissance and exploration permits only apply to non-designated areas because, for the designated areas, the geologic potential is known prior to their creation.

This concept of a designated area (reserve, dedicated zone, etc.) has become very common in different jurisdictions, in particular with AM permits and licences. As much as it is an attractive concept and apparently an easy solution to control the activity, in terms of its implementation it is very much more complex because it represents a huge investment by the government to develop geological surveys for the ASM sector. In more practical terms, the way this concept has been used is for the recognition of existing areas where there are already mining activities which are subsequently declared as being dedicated to ASM activities.

In the Act, the relationship between the designated areas and the mining permits is not clear, which is potentially problematic given that in a designated area there can co-exist several ASM operations.

The size of non-designated areas, particular for SSM permits, seems very small and this will create problems for the feasibility and economic stability of the mining operations over time. This lack of stability will promote continuing mobility, along with its serious social consequences. The problem of mobility is one of the characteristics that the ASM sector has been criticised for.

¹⁰⁵ Bitencourt 2009, Macedo 2015

Attributing excessively small areas (in some cases measured in m) was a characteristic of early ASM legal frameworks. However, more recently this tendency is changing towards larger areas, for the reasons explained above¹⁰⁶.

The size of an AM permit is not defined by the Act.

A3.1.2. Duration and Renewal

The **AM permit** has duration of a maximum of three years and may only be renewed once for the same period. The reason for this limitation on the number of allowable renewals is not clear. If the area still has mineral reserves, it would seem to make more economic sense to allow the continuation of the operation until the deposit has been fully exploited. In the case of a **mining permit**, the duration is up to five years and with a renewal for a maximum of five years. It is not clear whether it can be renewed more than once. The importance of allowing successive renewals is based on the premise of good management of mineral resources and security of the investment.

A3.1.3. Exclusivity

The attribution of a mineral right gives to the holder rights and obligations. To be able to exercise the rights and be accountable for the obligations, the right of exclusivity to perform mining activities in the licence area is fundamental. This right is important regardless of the size of the operation. The Law recognises exclusivity in the case of a mining permit but it is unclear whether this applies for prospecting permits and AM permits. However, the Law does state that AM permits cannot be granted in areas in which mineral rights have been granted (this rule applies to all licences and permits except for reconnaissance licence and permit).

Recognising this right of exclusivity for ASM mineral rights has become more a trend in the recent ASM legislation for the reasons noted above. Non-exclusivity rights for reconnaissance licences are an accepted practice in the legal frameworks internationally, including for LSM licences, mainly because of the preliminary nature of the activities. In general the LSM does not use this type of licence, but rather applies directly for exploration licences.

A3.1.4. Transfer

The right to transfer the permits is important because it is a guarantee that the value of the investment is protected over time. To give an illustration outside of the mining sector, no one invests in building or improving a house if they cannot sell it, regardless of the size or how simple or luxurious it is. The same logic applies for mining operations.

Under general provisions, the Act recognises the right of the holder of mineral rights to assign, transfer, and mortgage the rights with authorisation of the Cabinet Secretary, on recommendation of the Mineral Rights Board. However, it is unclear whether this generic right applies for the AM permit, (small-scale) prospecting permit and mining permit.

A3.1.5. Upgrade

In a sector with a diversity of sizes and different degrees/levels of development of ASM operations attributing the right to upgrade for different permits and licences is an important aspect to be considered by the ASM legal framework.

The Act recognises this right in the case of an AM permit but it is unclear for the other permits. If the objective of the Act is the improvement of the ASM mining operations this right should be considered for all permits and licences.

A3.1.6. Permit Requirements

Additionally to the above discussion of characteristics of the ASM permits, the requirements for permits attribution deserve some comments. The requirements are summarised in Table A3 below.

¹⁰⁶ Barreto 2011

Table A3: Permits attribution requirements

Type of permit	Application requirements	Other main requirements
Artisanal mining permit	<p>An application shall contain the following information</p> <p>(a) The name, nationality and address of the applicant or the name of the cooperative, association or group, place of registration and the registered office address;</p> <p>(c) The minerals and description of the area in respect of which the permit is sought;</p> <p>(e) The land owner's consent has been obtained where the land is not designated.</p> <p>- There is no requirement to prove the technical and financial capacity, expertise and experience, when it is wholly owned by Kenyans</p>	<ul style="list-style-type: none"> - Mine and produce minerals in an effective and efficient method - Shall observe good mining practices, health and safety rules and pay due regard to the protection of the environment - Observe regulations for the protection, health and safety of AM operations prescribe by the Cabinet Secretary - Shall compensate the owner of the land - The sale of minerals won by an artisanal miner shall be subject to the regulations prescribed by the Cabinet Secretary
(Small-scale) Reconnaissance permit	<p>An application shall contain the following information:</p> <p>(a) The full name, nationality and address of the applicant;</p> <p>(b) The mineral or minerals and the area in respect of which the permit is sought.</p>	<ul style="list-style-type: none"> - Take all necessary measures to protect the environment
(Small-scale) Prospecting permit	<p>An applicant shall contain the following information:</p> <p>(a) The full name, nationality and address of the applicant or, in the case of a body corporate, the place of incorporation and the registered address;</p> <p>(b) The mineral or minerals and the area in respect of which the permit is sought;</p> <p>(d) The particulars of the proposed prospecting operations to be carried out under the permit; and</p> <p>(e) Details of the experience and financial resources available to the applicant to conduct the prospecting operations.</p> <p>- There is no requirement to prove the technical and financial capacity, expertise and experience, when it is wholly owned by Kenyans</p>	<ul style="list-style-type: none"> (b) Take all necessary measures to protect the environment; and (c) Comply with any prescribed record keeping obligations.
Small-scale mining permit	<p>An applicant shall provide the following information:</p> <p>(a) The full name, nationality and address of the applicant, or, in the case of a body corporate, its place of incorporation, names and nationalities of the directors and its registered address;</p> <p>(b) The mineral in respect of which the permit is sought;</p> <p>(c) Details of the area in respect of which the permit is sought;</p> <p>(d) Particulars of the proposed mining operations to be carried out under the permit; and</p> <p>(e) Details of the mining experience and financial resources available to the applicant to conduct the mining operations. It is not a requirement the technical and financial capacity, expertise and experience, when it is wholly owned by Kenyans;</p> <p>g) The land owner's consent has been obtained where the land is not designated.</p>	<ul style="list-style-type: none"> (a) Conduct mining operations in compliance with a plan approved by the Cabinet Secretary; (c) Take all measures necessary to protect and restore the environment within the mining area; (d) Submit to the Cabinet Secretary up to date quarterly returns on mine development and mineral production; (e) Comply with any prescribed record keeping obligations; (f) Stack or dump any minerals or building materials or waste products in the manner provided for in the permit or as otherwise approved by the Cabinet Secretary; (g) Not use such equipment as may be prescribed in Regulations or chemicals such as cyanide and mercury; and (h) Pay royalties, fees, mining taxes and charges.

A3.2. Requirements for Permits Attribution

The Act is clear about the different requirements for obtaining the ASM permits. It is a simple process and is progressive (as more rights are attributed there are more obligations). This approach follows the current trend in ASM legal frameworks worldwide¹⁰⁷. More specific regulations will follow upon the approval of the mining regulations, which will bring specific guidelines about some of the obligations and instruments that are defined in the Act. Hopefully the regulations will reflect the same approach as the Act.

There are several small topics in the Law that deserve further clarification and improvements and these can be clarified in the mining regulations that still are in the advanced draft phase. The following is an overview of the subjects and the associated rationale for improvements.

A3.2.1. Special Treatment for Corporate Bodies Wholly Owned by Kenyans

The Act makes an important distinction between corporate bodies wholly owned by Kenyans and those not. In the latter case the corporate body needs to have at least 60% of the shareholding held by citizens of Kenya. This distinction has consequences in terms of the requirements to obtain the permits. However, the Act is contradictory in this aspect because, on one hand, it states that for AM permits and small-scale permits it is not a requirement to have the technical and financial capacity, expertise, and experience when the permit is wholly owned by Kenyans, whilst, on the other hand, for prospecting and mining permits, it demands details of the experience and financial resources available to the applicant prior to conducting the prospecting operations.

For the reasons noted previously, it does make sense that if the small-scale operations that are up to 40% foreign owned there should be a requirement to prove their experience and financial resources, but the mining regulations needs to clarify this distinction.

A3.2.2. Community Land

The Act takes great caution about mining permits and licences on community land (registered or unregistered) and this is a fundamental issue that needs to be protected.

However, the Act rules that:

- a) Without the consent of the authority that administers and manages community land in the case of registered community land, the mining rights shall not be granted
- b) In the case of unregistered community land, this consent is from National Land Commission

The Act also defines that this consent shall be deemed to be given where the registered owners of community land have entered into:

- a) A legally binding arrangement with the applicant for the prospecting and mining rights or with the GOK, which allows the conduct of prospecting or mining operations, OR
- b) An agreement with the applicant for the prospecting and mining rights concerning the payment of adequate compensation

The importance of this topic is based on two issues. In Taita Taveta, for example, the majority (if not the totality) of land is community land, and the current legal situation is the following: 'The land in the County is communally owned with approximately 35% having title deeds. Land adjudication is currently going on to ensure all land owners are issued with title deeds'¹⁰⁸.

In practical terms this mean that consent will become a necessary requirement for all mining licences and permits in the county.

The second issue is that Kenya has a separation between soil and subsoil property rights but in a way that it regularly appears that the soil right in community land includes the minerals. If this were not the case, the consent of the land authorities would not be necessary.

¹⁰⁷ SDC 2011

¹⁰⁸ TTCG 2013

Additionally, agreements between the holder or applicant of the permit and the holder of the community land title are common in several countries in order to protect the communities from impacts and to have the proper compensation. However, this is different from the case in which this contract is an instrument that allows (or prevents) the conducting of prospecting or mining operations.

These dispositions may create barriers to mining activities and potential conflicts between the counties and the national government in this area. It is important to remember that mining is not part of the devolution process but that through this kind of ambiguity it can indirectly become involved. During the fieldwork, the matter of roles and responsibilities around authorising mining activities related with this consent on registered community land was mentioned in terms of its potential to create tensions between county government and the national government.

Annex 4: Design and Implementation of Quantitative Household Surveys Conducted at the Case Study Sites

An accurate baseline provides evidence for responsive and appropriate technical and development recommendations, allows for best practice in design of policy and practice (incorporating gender, language, and literacy considerations), and establishes reliable means to measure impact over time.

For Kenya only, the project conducted a baseline assessment to provide an in-depth snapshot of ASM community dynamics.

The objective of the household surveys was to complement the **external view** of the economic relevance of ASM for national, local, and individual development as assessed the project team based on literature review, key economic performance indicators, key informant's interviews, and vast international experience, with the **internal view** of those being involved, affected, or benefitting from the ASM activity. Through the household survey, the project team attempted to give a voice to those, who are usually just the object of research. How does the local population perceive ASM? Is it seen as a curse or a blessing? What are the people's aspirations?

The household survey design follows international best practice¹⁰⁹ on a best effort basis.

A4.1. Determination of Sample Size

Sample size calculation was performed using the common formula¹¹⁰:

$$Sample\ Size = \frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p(1-p)}{e^2 N}\right)}$$

where

- N: population size
- e: margin of error
- z: z-score for desired confidence level
- p: standard of deviation

and commonly aspired parameters are:

- 95% confidence interval
- 5% margin of error

For Migori, the sample was calculated based on the 2009 population census¹¹¹ of Nyatike Sub-County which was 144,625. This was projected to increase to 181,680 in 2015 by the KNBS, with a population density of 268.1 persons per km². The population in the target area based on the population density of 268.1 comes to 7,518 persons, which translates to 1,504 households (average of five persons per household). Using the above formula, the sample size for 1,504 households was computed as 307 households, at the 95% confidence interval and 5% margin of error. The sample size of 307 was then proportioned based on the area of the two target sites, resulting in 215 and 92 households for Osiri and Mikei, respectively.

¹⁰⁹ UN-STATS 2005, Heemskerk 2005, UN-OCHA 2012.

¹¹⁰ For an easy-understandable explanation of underlying statistics see: <http://www.wikihow.com/Calculate-Sample-Size>

¹¹¹ KNBS 2010

For Taita Taveta, the sample size was also calculated using the 2009 population census data for the two target sub-counties of Mwatate (18,530 households) and Voi (21,670 households). Population density in 2009 for Mwatate was given as 25.13, whilst for Taita Taveta it stood at 11.8 people per km². Using the same procedure as above (at the 95% confidence interval and 5% margin of error), the sample size for each sub-county was computed as 176 and 205 households in Mwatate and Voi, respectively.

A4.2. Data Collection Tools

Following previous experience of Pact, the questionnaires were administered using mobile technology developed by Mobenzi Researchers (www.mobenzi.com). The technology uses mobile survey software and existing cellular networks for data collection and field-based data entry. For this purpose, the questionnaire is uploaded to the mobile phones of the data collectors. As surveys are completed, they are automatically uploaded to the Mobenzi Platform.

The Mobenzi Platform was expected to enrich the data collected by allowing geospatial mapping and integrating pictures. The Mobenzi software application also claims in-built features for limiting data errors and ensuring data quality; notwithstanding, it requires random data checking for quality assurance on a daily basis by the project monitoring and evaluation officer throughout the data collection exercise. All survey data on the Mobenzi Platform is encrypted maintaining the confidentiality of responses and data security.


Prior to commencement of data collection, all data collectors received training on Mobenzi Software and research ethics.

A4.3. Survey Questionnaire in Mobenzi Format

Section 1. Introduction


1.1

Interviewer

-  Enter the Interviewer Name.
Expects a single option response (**required**)
- Mashaka, Paul Mwawughanga [1]
 - Omondi, Collins Odhiambo [2]
 - Wanyaga, Magdalene Wangui [3]
 - Buluku, Lorraine Vusha [4]
 - Wanyonyi, Malemo Ezra [5]
 - Boru Nuria Ali [6]
 - Hussein Joseph Khayuki [7]
 - Kilonzo Kavuu Jacob [8]
 - Dadson Mwangi Thuku [9]
 - Faith Furaha Mlewa [10]
 - Fatuma Rajab Mwanganga [11]
 - Gichuhi Ann Wanjiku [12]


1.2

Date

-  Enter the Date this survey was started. Note: If you touch today, make sure your phone's date and time are correct
Expects a date response (**required**)
-


1.3

Start Time

-  Start Time
Expects a time response (**required**)
-


1.4

Survey site

 Select the Survey site
 Expects a single option response (**required**)


- Migori: Suba West [subawest]
- Migori: Nyatike [Nyatike]
- Taita Taveta: Voi [voi]
- Taita Taveta: Mwatate [mwatate]

1.5
 Respondent

 Respondent.
 Expects a single option response (**required**)


- Household head, male [1]
- Household head, female [2]
- Other household member, male [3]
- Other household member, female [4]

1.6
 Type of consent

 Is the consent verbal or written?
 Expects a single option response (**required**)


- Written [1]
- Verbal [2]

1.7
 household member

 Is this a household of:
 Expects a single option response (**required**)


- Family members who are related [1]
- People who sleep there that may or may not be biological / immediate family members [2]

1.8
 Respondents name


 Respondents name
 Expects a single line text response (**required**)

Section 2. General Questions To Members Of The Household


2.1
 Definitions-Kenya Population Housing Census

 Definitions follow the 2009 Kenya Population and Housing Census - Household: Refers to a person or group of persons who reside in the same homestead/compound but not necessarily in the same dwelling unit, have same cooking arrangements, and are answerable to the same household head. For purposes of this study, definition of a household is expanded to describe people who sleep in the same dwelling unit that may or may not be biological and immediate family members. - Household Head: This is the most responsible/respected member of the household who makes key decisions in the household on a day to day basis, and whose authority is honoured by all members of the household - Respondent: This may be the head of household or any other knowledgeable or responsible member of the household.


2.2
 Persons in HH total

 How many persons live in your household in total?
 Expects a numeric response (**required**)

2.3
 Total male


 Total Male in the household
 Expects a numeric response (**required**)

2.4
 Total female

 Total Female in the household
 Expects a numeric response (**required**)

2.5


Male HH members economic activity

 How many male household members perform an economic activity (earn some money)?

Expects a numeric response (**required**)


2.6

Male HH members no economic activity

 How many male household members do not perform an economic activity (for any reason)?

2.7


Female HH members economic activity

 How many female household members perform an economic activity (earn some money)?

Expects a numeric response (**required**)

2.8


Female HH members no economic activity

 How many female household members do not perform an economic activity (for any reason)?

Expects a numeric response (**required**)


2.9

Total Economically active

 Total number (male and female) of economically active members.

2.10


Boys in HH

 How many boys (younger than 15) live in your household?

Expects a numeric response (**required**)

2.11

Girls in HH

 How many girls (younger than 15) live in your household?

Expects a numeric response (**required**)

Repeat this section for value of **Total Economically active (2.9)**

Section 3. Questions To Economically Active Household Members


3.1

HH member number

Please answer the following questions for household member #REPEAT_IDX.

3.2

Age

 Enter the age of the #REPEAT_IDX member

Expects a numeric response (**required**)

Constraints

Response must be Greater Than or Equal '0' AND

Response must be Less Than or Equal '130'

3.3

Sex

Enter the gender

Expects a single option response (**required**)

Male [1]

Female [2]

3.4

Position in HH

Position in household.

Expects a single option response (**required**)

Head [1]

Spouse [2]

Son [3]


- Daughter [4]
- Relative [5]
- Member [6]
- Other [98]

Prerequisites

Skip when **Position in HH (3.4)** Not Equal 'Other [98]'

3.5


Position in HH - Other

 Please specify:

Expects a single line text response (**required**)

3.6

Resident

 Resident in the village

Expects a single option response (**required**)

- Since Birth [1]
- More than 10 years [2]
- More than 2 years, less than 10 years [3]
- 2 years and below [4]
- No answer [9]

3.7

educational level


 Highest educational level completed

Expects a single option response (**required**)

- None [1]
- Primary School [2]
- Secondary School [3]
- University [4]
- Other tertiary college [5]
- No Answer [9]

3.8

involved in mining

 Are you involved in mining related activities?

Expects a single option response (**required**)

- Yes [1]
- No [2]


Branches

If response Equals 'Yes [1]' then skip to **Mining related activities (3.9)**

If response Equals 'No [2]' then skip to **Non Mining current activities (3.11)**

3.9

Mining related activities

 Which Mining related activities are you CURRENTLY involved in?

Expects multiple selected options (**required**)


- Mineral extraction (digging) [1]
- Mineral processing; crushing, grinding, sieving, panning and sluicing [2]
- Providing services [3]
- Buying minerals [4]
- Other [5]
- No answer [9]

Prerequisites

Skip when **Mining related activities (3.9)** Excludes 'Other [5]'

3.10

mining activities not in the list

 Specify other, mining activities

Expects a single line text response (**required**)

3.11

Non Mining current activities

 Which NON-MINING activities are you involved in?

Expects multiple selected options (**required**)


- Agriculture [A]
- Trade [B]
- Craftsman [C]
- Office [D]
- Casual labour [E]
- Other [F]
- None [Y]
- No answer [Z]

Prerequisites

Skip when **Non Mining current activities (3.11)** Excludes 'Other [F]'

3.12

Other other current activities


 Specify other, other current activities

Expects a single line text response (**required**)

□□□□□

3.13

present

 Is this household member present?

Expects a single option response (**required**)

- Yes [1]
- No [2]

Branches

If response Equals 'No [2]' then skip to **HH member end (3.31)**

If response Equals 'Yes [1]' then skip to **previous activities (3.14)**

Prerequisites

Skip when **involved in mining (3.8)** Equals 'No [2]'

3.14

previous activities

 What were your previous income generating activities? Before you started mining

Expects multiple selected options (**required**)

- Agriculture [A]
- Trade [B]
- Craftsman [C]
- Office [D]
- Casual labour [E]
- Other [F]
- None [Y]
- No answer [Z]


Prerequisites

Skip when **involved in mining (3.8)** Equals 'No [2]' OR

Skip when **previous activities (3.14)** Excludes 'Other [F]'

3.15

Other previous income generating activities

 Specify previous income generating activities

Expects a single line text response (**required**)


□□□□□

Prerequisites

Skip when **involved in mining (3.8)** Equals 'No [2]'

3.16

Rank mining Most Important

 Rank the most important mining activity to you.

Expects a single option response (**required**)

- Mineral extraction (digging) [1]
- Mineral processing; transporting ore or water, crushing, grinding, sieving, panning and sluicing [2]
- Providing services [3]
- Buying minerals [4]

Other [9]

Prerequisites

Skip when **involved in mining (3.8)** Equals 'No [2]'

3.17

Rank mining 2nd most

Rank the 2nd most important mining activity to you.

Expects a single option response (**required**)

Mineral extraction (digging) [1]

Mineral processing; Transporting ore or water, crushing, grinding, sieving, panning and sluicing [2]

Providing services [3]

Buying minerals [4]

Other [9]

Not Applicable. Skip [99]

Prerequisites

Skip when **Rank mining 2nd most (3.17)** Equals 'Not Applicable. Skip [99]' OR

Skip when **involved in mining (3.8)** Equals 'No [2]'

3.18

Rank mining 3rd important

Rank the 3rd most important mining activity to you.

Expects a single option response (**required**)

Mineral extraction (digging) [1]

Mineral processing; Transporting ore or water, crushing, grinding, sieving, panning and sluicing [2]

Providing services [3]

Buying minerals [4]

Other [9]

Not Applicable. Skip [99]

Prerequisites

Skip when **Rank mining 2nd most (3.17)** Equals 'Not Applicable. Skip [99]' OR

Skip when **Rank mining 3rd important (3.18)** Equals 'Not Applicable. Skip [99]' OR

Skip when **involved in mining (3.8)** Equals 'No [2]'

3.19

Rank mining 4th important

Rank the 4th most important mining activity to you.

Expects a single option response (**required**)

Mineral extraction (digging) [1]

Mineral processing; Transporting ore or water, crushing, grinding, sieving, panning and sluicing [2]

Providing services [3]

Buying minerals [4]

Other [9]

Not Applicable [99]

Prerequisites

Skip when **involved in mining (3.8)** Equals 'No [2]' OR

Skip when **Rank mining 2nd most (3.17)** Equals 'Not Applicable. Skip [99]' OR

Skip when **Rank mining 3rd important (3.18)** Equals 'Not Applicable. Skip [99]' OR

Skip when **Rank mining 4th important (3.19)** Equals 'Not Applicable [99]'

3.20

Rank mining 5th important

Rank the 5th most important mining activity to you.

Expects a single option response (**required**)

Mineral extraction (digging) [1]

Mineral processing; Transporting ore or water, crushing, grinding, sieving, panning and sluicing [2]

Providing services [3]

Buying minerals [4]

Other [9]

Not Applicable [99]

Prerequisites

Skip when **present (3.13)** Equals 'No [2]' OR

Skip when **Non Mining current activities (3.11)** Includes 'None [Y]' OR

Skip when **Non Mining current activities (3.11)** Includes 'No answer [Z]'

3.21

Rank other economic activities

Rank your other activities in terms of MOST economic importance for you.

Expects a single option response (**required**)

Agriculture [A]

Trade [B]

Craftsman [C]

Office [D]

Casual labour [E]

Other [F]

Prerequisites

Skip when **Non Mining current activities (3.11)** Includes 'None [Y]' OR

Skip when **Non Mining current activities (3.11)** Includes 'No answer [Z]'

3.22

Rank other 2nd important economic activities

Rank your other activities in terms of 2nd most economic importance for you.

Expects a single option response (**required**)

Agriculture [A]

Trade [B]

Craftsman [C]

Office [D]

Casual labour [E]

Other [F]

Not Applicable. Skip [99]

Prerequisites

Skip when **Rank other 2nd important economic activities (3.22)** Equals 'Not Applicable. Skip [99]' OR

Skip when **Non Mining current activities (3.11)** Includes 'None [Y]' OR

Skip when **Non Mining current activities (3.11)** Includes 'No answer [Z]'

3.23

Rank other 3rd most economic activities

Rank your other activities in terms of 3rd most economic importance for you.

Expects a single option response (**required**)

Agriculture [A]

Trade [B]

Craftsman [C]

Office [D]

Casual labour [E]

Other [F]

Not Applicable. Skip [99]

Prerequisites

Skip when **Rank other 2nd important economic activities (3.22)** Equals 'Not Applicable. Skip [99]' OR

Skip when **Rank other 3rd most economic activities (3.23)** Equals 'Not Applicable. Skip [99]' OR

Skip when **Non Mining current activities (3.11)** Includes 'None [Y]' OR

Skip when **Non Mining current activities (3.11)** Includes 'No answer [Z]'

3.24

Rank other 4th most economic activities

Rank your other activities in terms of 4th most economic importance for you.

Expects a single option response (**required**)

Agriculture [A]

Trade [B]

Craftsman [C]

Office [D]

Casual labour [E]

Not Applicable. Skip [99]

Prerequisites

Skip when **Rank other 2nd important economic activities (3.22)** Equals 'Not Applicable. Skip [99]' OR

Skip when **Rank other 3rd most economic activities (3.23)** Equals 'Not Applicable. Skip [99]' OR

Skip when **Rank other 4th most economic activities (3.24)** Equals 'Not Applicable. Skip [99]' OR

Skip when **Non Mining current activities (3.11)** Includes 'None [Y]' OR

Skip when **Non Mining current activities (3.11)** Includes 'No answer [Z]'

3.25

Rank other 5th most economic activities

Rank your other activities in terms of 5th most economic importance for you.

Expects a single option response (**required**)

Agriculture [A]

Trade [B]

Craftsman [C]

Office [D]

Casual labour [E]

Other [F]

Not Applicable. Skip [99]

Prerequisites

Skip when **Rank other 2nd important economic activities (3.22)** Equals 'Not Applicable. Skip [99]' OR

Skip when **Rank other 3rd most economic activities (3.23)** Equals 'Not Applicable. Skip [99]' OR

Skip when **Rank other 4th most economic activities (3.24)** Equals 'Not Applicable. Skip [99]' OR

Skip when **Rank other 5th most economic activities (3.25)** Equals 'Not Applicable. Skip [99]' OR

Skip when **Non Mining current activities (3.11)** Includes 'None [Y]' OR

Skip when **Non Mining current activities (3.11)** Includes 'No answer [Z]'

3.26

Rank other 6th most economic activities

Rank your other activities in terms of 6th most economic importance for you.

Expects a single option response (**required**)

Agriculture [A]

Trade [B]

Craftsman [C]

Office [D]

Casual labour [E]

Not Applicable. Skip [99]

Other [F]

Prerequisites

Skip when **involved in mining (3.8)** Equals 'No [2]' OR

Skip when **Rank other 2nd important economic activities (3.22)** Equals 'Not Applicable. Skip [99]' OR

Skip when **Rank other 3rd most economic activities (3.23)** Equals 'Not Applicable. Skip [99]' OR

Skip when **Rank other 4th most economic activities (3.24)** Equals 'Not Applicable. Skip [99]' OR

Skip when **Rank other 5th most economic activities (3.25)** Equals 'Not Applicable. Skip [99]' OR

Skip when **Rank other 6th most economic activities (3.26)** Equals 'Not Applicable. Skip [99]' OR

Skip when **Non Mining current activities (3.11)** Includes 'None [Y]' OR

Skip when **Non Mining current activities (3.11)** Includes 'No answer [Z]'

3.27

Rank other 7th most economic activities

Rank your other activities in terms of 7th most economic importance for you.

Expects a single option response (**required**)

Agriculture [A]

Trade [B]

Craftsman [C]

Office [D]

Casual labour [E]

Not Applicable. Skip [99]

Other [F]

Prerequisites

Skip when **involved in mining (3.8)** Equals 'No [2]' OR

Skip when **Mining related activities (3.9)** Includes 'No answer [9]'

3.28

Drop economic activity

Which Mining activity would you like to abandon?

Expects multiple selected options (**required**)

- Mineral extraction (digging) [1]
- Mineral processing [2]
- Providing services [3]
- Buying mineral [4]
- Other [5]
- None, I do not want to abandon any [8]

Prerequisites

Skip when **Non Mining current activities (3.11)** Includes 'None [Y]' OR

Skip when **Non Mining current activities (3.11)** Includes 'No answer [Z]'

3.29

Drop other economic activity

Which Other (non-mining) economic activity would you like to abandon?

Expects multiple selected options (**required**)

- Agriculture [A]
- Trade [B]
- Craftsman [C]
- Office [D]
- Casual labour [E]
- None, I do not want to abandon any [8]

Prerequisites

Skip when **Drop economic activity (3.28)** Includes 'None, I do not want to abandon any [8]' OR

Skip when **Drop other economic activity (3.29)** Includes 'None, I do not want to abandon any [8]' OR

Skip when **involved in mining (3.8)** Equals 'No [2]' OR

Skip when **Mining related activities (3.9)** Includes 'No answer [9]' OR

Skip when **Non Mining current activities (3.11)** Includes 'None [Y]' OR

Skip when **Non Mining current activities (3.11)** Includes 'No answer [Z]'

3.30

Why

Why would you drop this economic activity?

Expects a single option response (**required**)

- Not profitable [1]
- Too heavy work [2]
- Health reasons [3]
- Other (specify) [4]
- No answer [9]

3.31

HH member end

Completed. You have finished the survey on household member **#REPEAT IDX**.

Section 4. Perception of mining

4.1

Perception of mining

Questions about perception of mining to be answered if possible by consensus of all household members present (or by respondent).

4.2

Is mining a good job

Is mining a good job?

Expects a single option response (**required**)

- Better than other jobs [1]
- Equal to other jobs [2]
- Worse than other jobs [3]

4.3

Ease to get into mining

Is it easy to get involved in mining?

Expects a single option response (**required**)

- Yes [1]

No [2]

4.4

know miners

Do you know anyone who works in a mining related activity?

Expects a single option response (**required**)

Yes [1]

No [2]

4.5

Estimate income

How much do you estimate that someone employed in a mining activity can earn?

Expects a single option response (**required**)

Less than an agriculture worker [1]

Same as an agriculture worker [2]

More than an agriculture worker [3]

I do not know [9]

4.6

self employed Estimate income

How much do you estimate that someone who is self-employed in a mining activity can earn?

Expects a single option response (**required**)

Less than an agriculture worker [1]

Same as an agriculture worker [2]

More than an agriculture worker [3]

I do not know [9]

4.7

once get involved

Once people get involved in mining...

Expects a single option response (**required**)

It becomes a permanent occupation. [1]

it is only temporary [2]

Prerequisites

Skip when **once get involved (4.7)** Equals 'it is only temporary [2]'

4.8

reasons why it is permanent

Why does mining become a permanent occupation?

Expects a single option response (**required**)

Because it is profitable [1]

Because they don't find anything else [2]

Other [3]

Prerequisites

Skip when **reasons why it is permanent (4.8)** Not Equal 'Other [3]' OR

Skip when **once get involved (4.7)** Equals 'it is only temporary [2]'

4.9

Other reasons to remain in mining

Please specify Other reasons to remain in mining

Expects a single line text response (**required**)

□□□□

Prerequisites

Skip when **once get involved (4.7)** Equals 'It becomes a permanent occupation. [1]'

4.10

reasons why it is temporary

Why does mining become a temporary endeavour?

Expects a single option response (**required**)

Because it is seasonal [1]

Because they look for something that pays better [2]

Because it is too hard work [3]

Other [4]


Prerequisites

Skip when **reasons why it is temporary (4.10)** Not Equal 'Other [4]' OR

Skip when **once get involved (4.7)** Equals 'It becomes a permanent occupation. [1]'

4.11

Other reasons to leaving mining

 Please specify Other reasons to leaving mining endeavors

Expects a single line text response (**required**)

4.12

get out of mining

Is it difficult to abandon mining activities?

Expects a single option response (**required**)

Yes [1]

No [2]

Prerequisites

Skip when **get out of mining (4.12)** Equals 'No [2]'

4.13

Why difficult

 Yes Selected. Why is it difficult to abandon mining Activities?


Expects a single line text response (**required**)

Prerequisites

Skip when **get out of mining (4.12)** Equals 'Yes [1]'

4.14

Why not difficult

 No Selected: Why is it NOT difficult to abandon mining?

Expects a single line text response (**required**)

4.15

Best Practices

Best Practices: What is the best way to work in mining?

Expects a single option response (**required**)

Receiving a salary from someone (as paid worker) [1]

Sharing revenues in a group (in a cooperative, association, risk & profit sharing agreement, etc.) [2]

Doing it individually [3]

Other Specify [4]

Prerequisites

Skip when **Best Practices (4.15)** Not Equal 'Other Specify [4]'

4.16

Other best practices

 Please specify best practices

Expects a single line text response (**required**)

4.17

consensus vs individual

Note to interviewer: Please indicate if responses to the above section are based on consensus of several household members or by one respondent.

Expects a single option response (**required**)

Consensus [1]

Individual [2]

Section 5. Economic situation of the household

5.1

Livestock in household

Does your household own any of the following items: Livestock

Expects multiple selected options (**required**)

Small livestock (chicken, bee hives, rabbits) [1]


Medium livestock (sheep, goat, pig, donkey) [2]

Big livestock (cattle, horse, camel) [3]

None of the above [9]

5.2


Communication in the household

 Does your household own any of the following items: Communication
Expects multiple selected options (**required**)

- Radio [1]
- TV [2]
- Mobile Phone [3]
- Computer [4]
- None of the above [9]

5.3


Household Items

 Does your household own any of the following items: Household
Expects multiple selected options (**required**)

- Electric or gas stove [1]
- Refrigerator [2]
- Own well or tap water [3]
- None of the above [9]

5.4


Transport items

 Does your household own any of the following items: Transport
Expects multiple selected options (**required**)

- Bicycle [1]
- Motorcycle or Tuktuk [2]
- Car [3]
- Truck/lorry/tractor/or similar [4]
- None of the above [9]

5.5


school fees

 How easily can you afford all schooling costs for your children?
Expects a single option response (**required**)

- Without problems [1]
- A manageable effort [2]
- A huge effort [3]
- I do not have children of school going age. [4]


5.6

Note 2

 Note to interviewer: For better understanding of this question, end by asking how many children are in the household; how many are of school-going age and if they are in school.

5.7


Number of children of school going age

 How many children of school going age are in the household?
Expects a numeric response (**required**)

□□□□□

5.8


Number of children in school

 How many children of school going age are attend school?
Expects a numeric response (**required**)

□□□□□

5.9

Thanks you End time


 Thank the respondent for their time and give them an opportunity to ask any questions. Note the time the interview ended

Expects a time response (**required**)

□□□□□

5.10

GPS coordinate

 Scan for GPS cordinates: Remember to enable Locations/GPS on your phone
Expects a latitude and longitude coordinate (optional)

Prerequisites

Skip when **Type of consent (1.6)** Not Equal 'Written [1]'

5.11

consent form

Capture a photo of the signed consent to conduct this survey

Expects an image response (**required**)

5.12

The end

The end. Thank you for your time

A4.4. Sampling Methodology and Surveys Completed

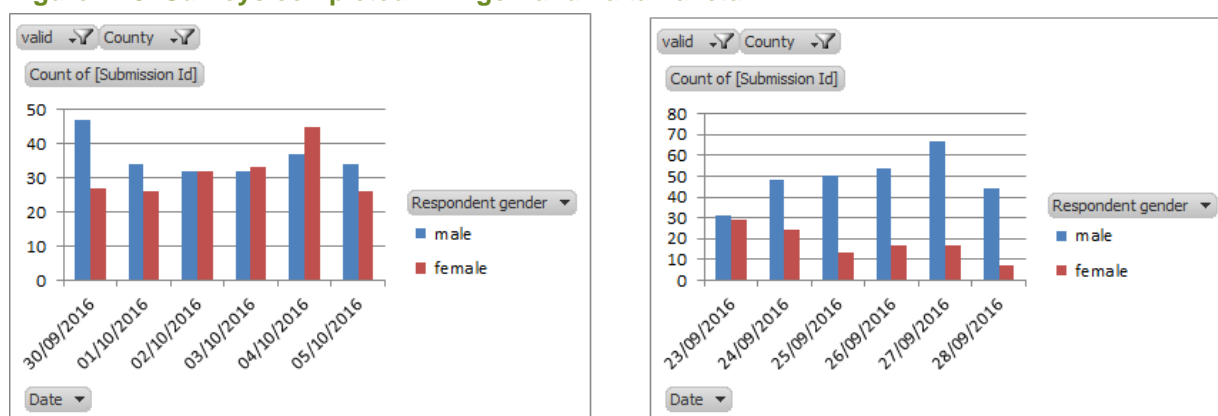
In **Migori**, the data collectors used systematic random sampling, skipping every two houses to survey the third household in the mining site. In other areas outside the mining site, the team surveyed every second household, skipping only one house as the areas were not as densely populated. However, systematic random sampling was not strictly adhered to in Ogaka and Matanda villages because these areas were surveyed on Saturday and Sunday, respectively, when people were in church. The data collectors in this case interviewed all the households that had somebody at home and only skipped those which were vacant.

A total of 405 surveys were completed in Nyatike Sub-County: 259 in Osiri and 146 in Mikei.

In **Taita Taveta**, the data collectors used cluster sampling to identify communities in the two sub-counties that live in areas close to mining sites namely Kasigau, Mkuki, Kambanga, Kamtonga, and Aliya. Due to the low population density in Taita Taveta, the data collectors purposed to interview every household in the target communities that had someone at home. Local guides were used in both Migori and Taita Taveta Counties to accompany the students and assist with interpretation. In Taita Taveta, the local guides also helped to ensure the data collectors were safe and did not get lost in the vast expanse they had to traverse.

A total of 401 household surveys were completed in Taita Taveta County: 203 in Mwatate Sub-County and 198 in Voi Sub-County.

Figure A25: Surveys completed in Migori and Taita Taveta



A4.5. Issues Encountered during Application of the Survey

- GPS readings could not be captured for all the surveys as the GPS function on several of the new handsets that the data collectors were using. As a result, the GIS maps generated from the study do not show the same tally of actual surveys completed.
- Most of the data collectors in Migori could not speak the local language, and many respondents were not comfortable with English or Kiswahili. The team engaged local interpreters, which may have affected understanding of some of the questions posed per responses given.
- For questions that required a narrative entry, for instance to explain the 'Why' of a response to a preceding question, the use of cell phones limited the amount of narrative the data collectors could enter, thereby limiting the responses to a few words that may not provide adequate details for data analysis.

The following data capture issues were also noted and addressed during the data cleaning exercise:

- Some questions were tricky and easily misunderstood by both the data collectors and the respondents. For example, the question of whether it was difficult to abandon mining. Respondents would state it was not difficult to abandon mining, and then proceed to qualify the answer by a statement that would be for the negative response. For example, one would say it pays well as a qualifying statement when the response was a NO answer to the previous question.
- On the number of persons living in the households, it was realised that some respondents were not including themselves when giving a count of the number of people in the household. This resulted in numbers that did not tally since respondents would include themselves in the later questions on the economically active household members.
- On the number of children in school within the household, there were situations where households would not list children who are away studying in tertiary institutions. This presented a disconnect between the data captured in the Introduction section of the questionnaire and the last section on household economic status.
- When it came to surveying households of individuals who are not related, the enumerators treated each individual present as a 'household' and asked them questions about their respective family members who live elsewhere. This was common in households located within or in the vicinity of a mining camp.

A4.6. Data Processing

Although the Mobenzi Platform provides a great tool set for quick analytics, such as charts and tables to visualise responses, in-depth processing like gender disaggregated analysis or performing Chi-Square tests, can only be performed with appropriate desktop software applications.

Annex 5: Detailed Case Study: Migori

A5.1. Area Overview

In September 2016, the research team visited the Migori region in the South East of Kenya and in particular the Osiri village and minesite. Osiri is located approximately 20 km East of Migori District Capital, half way between the city and the coast of Lake Victoria.

Figure A26: Migori Area



The Osiri village and mine site are relatively new. It was founded only a few years ago, between 2011 and 2013 (Figure A26) after an artisanally mineable gold deposit had been discovered, and has since evolved into a flourishing local economy. With an estimated population of 2,000–3,000 people, Osiri counts today on more than 50 shops from pharmacies to haircutters, 5 hotels, and 37 restaurants¹¹².

Similar to the Osiri village, most mineral processing plants in the area using Tanzanian cyanide leaching technology were established in recent years.

Despite the apparent rush-type origin of Osiri, gold mining is considered a traditional activity in Migori, and Osiri is seen as representative for a village based AM community.

A5.1.1. Livelihoods and the Local Population

Nyatike Sub-county has a current population ranging between approximately 145,000 people¹¹³, which includes 3,500–5,000 who reside in the semi-temporary town at Osiri¹¹⁴. A large proportion of

¹¹² Interview with a member of the Osiri mine committee on 27 September 2016

¹¹³ KNBS 2010

¹¹⁴ The average household in Osiri 'town' and surrounding areas is comprised of 5.45 people, of which 1.2 household members are girls and 1.2 members are boys (under 15 years).

households (45%) are headed by women and gender differences in socio-economic status at both household and individual levels, as explored throughout the case study, are clear.

Figure A27: Gold mining takes place alongside strongly tied to farming and fishing livelihoods

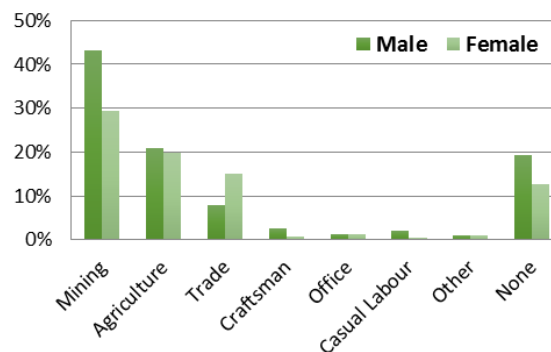


Although agriculture is often practised alongside mining in the communities surrounding Osiri, mining is, by far, the main income-generating activity in the area (Figure A28). Of the economically active population, 73% are individuals are engaged in some form of ASM work, whilst only 1% of household heads surveyed indicated that they did not know anyone working in the sector.

A number of factors likely work in parallel to influence the economic reliance on mines. On average, 65% of women and 72% of men surveyed believed that those involved in mining earn more than those in agriculture and, indeed, 78% of **miners surveyed did not wish to abandon their jobs in the mines.**

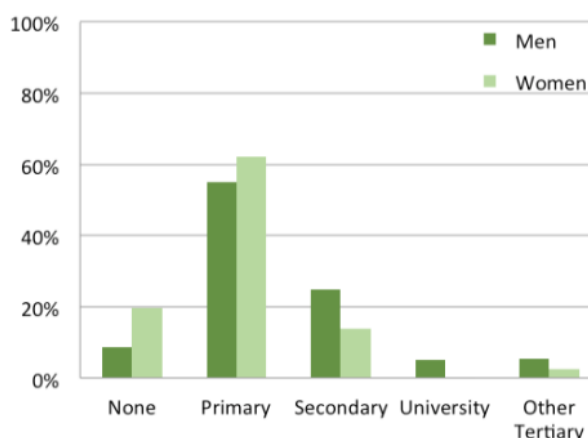
Some miners interviewed had been engaged in ASM since their teens and, indeed, **only 17% and 19% of women and men miners, respectively, engaged in a different economic activity (e.g., farming) prior to their work in ASM.** This may suggest an early entry to the sector (e.g., during childhood or youth), a paucity of better alternatives or increased attractiveness of the sector (e.g., with new discoveries, gold prices) drawing subsistence farmers to the mines or a combination of these factors.

Figure A28: Main Household Economic Activity (by sex of household head; p<0.05)



Socio-economic status likely plays a key role in attracting women and men into work the mines, with clear gender disparities likely playing a role in the distribution of benefits from ASGM. Only 22% of economically active individuals have education above primary school levels and women are twice as likely as men to have no education (20% vs. 9%) (Figure A29).

Figure A29: Education levels completed (by sex of economically active individuals; p<0.05)



With respect to assets, less than half of households are likely to own medium or large sized livestock (e.g., goats, cattle), with male-headed households showing a slight advantage over those headed by women (49% vs. 40%, respectively). More than 90% of households do not have piped water or gas or electric stoves (indicating reliance on charcoal) and 56% of households lack mobile phones. Of

economically active men and women, respectively, 56% and 65% do not own a means of transport (e.g., bicycle, vehicle) other than walking.

Within this context, **ASM seems to provide an important means to 'step up'**, particularly when individual incomes and differences between livelihoods are further examined, as observed in the Osiri gold mining area.

A5.2. Supply Chain Actors, Activities, and Costs of Production

A5.2.1. Economic Relations at Mine Sites

The ASGM supply chain at mine sites can be divided into two economic sub-phases: mineral extraction and mineral processing.

Mineral Extraction

The extraction phase is characterised by money being replaced by ore. In almost all economic relations between extraction actors, payments are made with ore bags. From diggers to landlords there are no money transactions. The payment unit is the bag, sometimes half bag or even a handful of ore in some cases. Although payments of any debt or salary in unwrought precious metals is prohibited by law¹¹⁵, the same law explicitly excludes 'ore in situ' from the definition of unwrought precious metals. Apparently, this definition was amended or introduced in 1952¹¹⁶ specifically allowing ore payments within the mining economic relations. Such payments offer several advantages for mining actors: (i) it sets a parallel monetary system independent of any national monetary system accepted by all mine actors (ii) it allows to avoid taxation and social contributions; and (iii) it is a fair sharing system in a partnership as the value of one bag is the same for all.

The Osiri and the Rongo mines in the Migori region¹¹⁷ have a particular distribution of the extracted ore between owners of the shaft and the miners. It is based on a '2 to 1' system. Two bags of ore for the owners, one bag for the miners.

In both sites the owners of the shafts are in charge of investing to reach the gold veins. Investment is substantial. In the Osiri mine, KES 2 million (USD 20,000) were invested by five partners in the Karumba shaft in order to access the gold vein¹¹⁸. The shaft was 200 feet deep and the entire tunnel system more than 1 km long according to the managers. 100 miners were working in the shaft on a 24-hour basis, six days a week. Another mine owner interviewed in Masara village and operating a small mine in the sector, had invested KES 1.2 million (USD 12,000) before reaching the vein. Her distribution system with the miners was different to the '2 to 1' as the maintenance of the compressor was paid by the workers. The split was 60% for the owner and 40% for the miners.

Shaft owners normally bear with all the costs associated with advancing shafts and tunnels (blasting), its safety (timbering), its electric supply and dewatering. As an example, a blast in Karumba shaft at Osiri mine costs KES 30,000 (approximately USD 300) in explosives only and is usually performed twice every week. The miners employed to prepare the mineshaft for extraction are paid KES 300 (USD 3) per day, which is equivalent to KES 7,800 (USD 78) per month.

Ownership of land is also different in the sites in Osiri and Rongo. In Osiri, apparently the land is the property of the state and a cooperative is in charge of regulating the village, the security and the relations with the local government. In Rongo, the land is the property of a sole owner.

Mineral Processing

After extraction, the ore processing is done on site. Different actors along the processing chain interact and are usually paid on a 'per bag' basis¹¹⁹.

¹¹⁵ Article 12, Trading in Unwrought Precious Metals Act (Kenya 1987)

¹¹⁶ Section 2. Trading in Unwrought Precious Metals Act (Kenya 1987). Amendment by Act No. 10 of 1952.

¹¹⁷ The team visited these two sites in the Migori region.

¹¹⁸ Information extracted from interviews with mine managers

¹¹⁹ Fees are based on interviews realised on the Osiri mine.

- **Crushers:** usually performed by women, crushing consists in reducing the size of the ore to an appropriate size for the ball mills. It is performed by hand and is paid KES 150 (USD 1.50) per bag fee;
- **Millers:** performed with locally constructed ball mills for KES 300,000 (USD 3,000) per full unit¹²⁰. The ball mill unit is generally composed of one or two mills ran either by the owner or an employee. The milling fee is KES 300 (USD 3) per bag and one mill can process approximately 20 bags per day.
- **Sluicers:** generally performed by women, sluicing and amalgamation are done on a basis of KES 200 per bag (USD 2) (KES 150 for sluicing and KES 50 for amalgamation). A team of sluicers (generally 2 persons) can process approximately five bags per day. The sluicing and amalgamation facilities normally belong to an investor who provides the mercury.¹²¹ The investor receives in return the tailings that he resells to a cyanidation plant on a basis of KES 3,750 (USD 37.50) per tonne.
- **On-site buyers or traders:** they are at the end of the mine site supply chain. The average buying volume is 50 grams of unrefined gold per week per trader (the purity of the Osiri mine gold is estimated at 90%). Their estimated margin is KES 200–250 per g.

Figure A30: Osiri mine site supply chain



A5.2.2. Economic Relations After the Mine Site

Gold cannot be officially traded in Kenya anymore. However, gold traders can be found in villages¹²². Dealers' licences were revoked in 2013 following the discovery that conflict tainted gold was being informally introduced in the country and then officially exported. Since 2014, only gold producers can officially export gold. In 2013 exports were USD 87 million corresponding to the 2013 average LBMA fixings to 1.9 tonnes of gold. In 2015, exports amounted to USD 10 million corresponding at 2015 average LBMA fixings to 262 kg of gold sold by the two active mines of Kilimapesa¹²³ and Karebe^{124,125}.

It is a fact that ASGM is being exported informally, evading the 5% royalty, mainly to Uganda and then re-exported to UAE in the actual state or once refined in Entebbe¹²⁶.

¹²⁰ Ball mill 1.5mm thick with gearbox, 20Hp diesel Chinese engine

¹²¹ Sold at KES 20,000 (USD 200) per kg at time of on site visit

¹²² The team visited gold traders in the two mine sites visited, in Masara (mining village in Migori district) and in Migori. Meeting gold traders in Nairobi was not possible because of the prohibition.

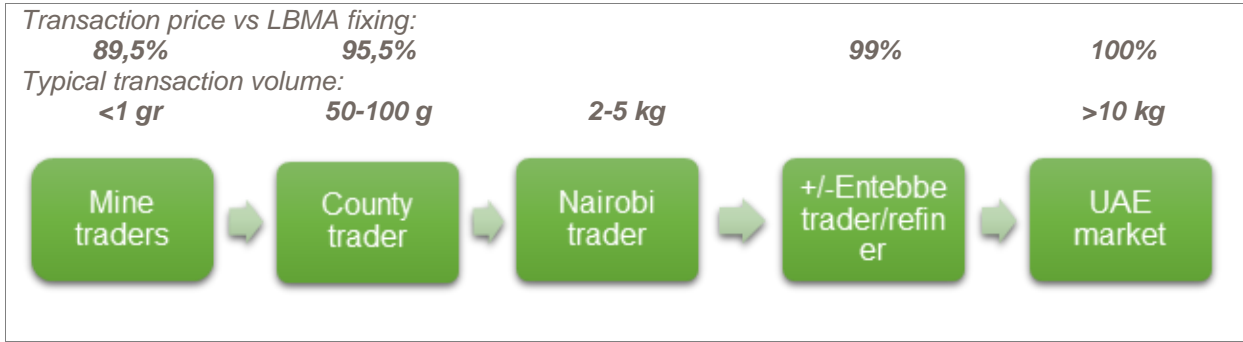
¹²³ Goldplat 2016

¹²⁴ Maris 2016

¹²⁵ Date collected from Ministry of Mines of Kenya and LBMA

¹²⁶ Information retrieved in October 2016 from African Gold Refinery Ltd (<http://www.agr-afr.com>), confirming Blore (2015)

Figure A31: Kenya ASM gold supply chain (buying prices are expressed in % of LBMA fixing)



A5.2.3. Mineral Production Methods and the Gender Division of Labour

In Osiri as in adjacent ASGM areas in Migori, ore extraction and processing is carried out via underground extraction, crushing, milling, sluicing and amalgamation, followed by amalgam burning and recovery of the doré, comprised of gold, residual mercury and other impurities. **Direct mine and processing employment in Osiri was assessed as approximately 620 persons (+/- 10%)¹²⁷** (Figure A32).

As shown in Figure A33, a distinct gender division of labour exists at Osiri, which has implications in terms of gender distribution of benefits from ASM in the area (section 3.1.3). Surveys indicate that 62% of those working in the mines are men and 38% are women.

Figure A32: Osiri Mine provides direct employment for approximately 620 women and men

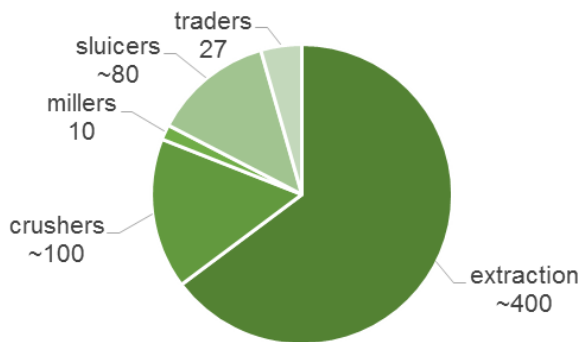


Figure A33: Gender division of labour at Osiri Mine



Extraction

Men constitute 92% of the extraction workforce, which employs approximately 400 workers in total. Underground mining takes place in one of four operating shafts, the most productive of which employs approximately 100 men and yields approximately 100 sacks of ore per day from a main 60m deep shaft connected to a gallery of tunnels that can extend for 100 m¹²⁸.

¹²⁷ Excludes workers engaged in drilling and blasting, timbering and supervisors.

¹²⁸ For those that purchase ore and pay for processing, an average (and exceptionally high) cut-off grade of approximately 1.7 g per bag or 24 g per tonne is estimated¹²⁸. However, the grade is highly variable (with many ore buyers reporting occasional losses), thus an average grade of 18g per tonne was applied for the purpose of estimation.

Figure A34: (left) Miners haul up sacks of ore from depth using a winch; (right) Most miners rely on small hammers, chisels and a headlamp



Extraction takes place in two ongoing phases:

- **Development/preparation:** This involves drilling using jackhammers and blasting with explosives is followed by a four-hour period to wait for dust to settle and gases to evacuate. Underground workings are then inspected by the blasterman and timberman and related timbering is done to support unstable ground.
- **Extraction:** Paid labourers remove waste rock discarded by miners in sacks for disposal at the surface whilst workers paid based on production use hammers and pickaxes to break ore (exposed wall rock or fragmented by blasting) into transportable sizes that they later haul to surface in sacks.

Workers are typically equipped with rubber boots and small flashlights.

Extraction takes place 24 hours per day and 6 days per week, however, downtime for drilling and blasting requires approximately 8 hours per blast and is carried out twice weekly.

Underground miners do not strictly work in set shifts or teams but can choose to work individually or in teams of 2 to 5 and for a number of hours (typically 2 to 3) as needed to acquire at least 1 full sack of ore. They gain entry to the mine only as others exit in order to ensure numbers underground are reasonably limited given space constraints¹²⁹. On their return to surface with their ore, they receive their share (2:1 split with owners). They then either sell or pay for processing of their ore and then break for the day or re-join the queue to return to work. Typically men using bicycles haul ore in sacks to the processing areas.

Mineral Processing

Women constitute 62% of the mineral processing (crushing, milling, sluicing, amalgamation) workforce. Main steps include:

- **Crushing:** Ore is manually broken using small sledgehammers on large tarpaulins into sizes that can be fed into the mill (approximately 1 inch diameter). Crushing takes place in 30-40 areas around the site and is largely carried out by women (approximately 80%).
- **Milling:** Crushed ore is fed into locally constructed, generator-driven octagonal ball mills in order to reduce its size into that of fine powder. Each milling unit is comprised of 1-2 ball mills and can

¹²⁹ Approximately 120 miners are underground at any given time in the four shafts (ranging between 10 workers for the smallest shaft and up to 60 for the largest).

process approximately 20 bags per day. Although 37-40 mills are located at Osiri, only about 10 mills are active at a given time. Milling units are staffed by an owner or paid workers, mainly men.

- **Sluicing and amalgamation:** This is performed individually or in teams of two, wherein one person carries out sluicing and the other conducts amalgamation. Although mainly done by women, some men also do this work. A two-person team can process approximately 5 bags of milled ore per day. Although 50-60 sluices are found at Osiri, only around 40 are active at any given time.
 - Sluicing involves slowly pouring milled ore with process water over an angled, wooden sluice box lined with a burlap mat wherein heavier particles (i.e., gold) are trapped. Residual mercury is in process water, thus an initial (but limited) phase of amalgamation takes place.
 - Once a sack has been processed, the mat is carefully removed and washed in a plastic basin to remove particles retained in the fibres. Throughout the process, tailings (waste) collect in a small basin at the end of the sluice and are periodically removed with a shovel and stacked in adjacent piles for sale to cyanidation plants.
 - Amalgamation takes place in small impoundments next to sluices. Mercury is added to the concentrate recovered from the mats and mixed by hand in basins resulting in the formation of a mercury gold amalgam. Waste (residual mercury, lost gold, waste minerals) is discharged into the pond. The amalgam is squeezed through a piece of cloth and the amalgam taken for burning and sale to nearby traders.
- **Amalgam decomposition:** Gold buyers burn the amalgam using a small torch or on a charcoal fire just outside their small, covered, iron sheets walled 'shops'. Mercury vapour is released into the atmosphere and remaining gold is weighed and purchased based on a purity of 90%.

Figure A35: Top: Ore is Crushed (top left) Following by Grinding in Octagonal Mills (top right). Centre: Milled Ore is Poured with Water Over Crude Washing Tables where Concentrate (heavy minerals including gold) is Trapped in Mats (centre left). Mats are Carefully Washed in Large Basins to Collect Concentrate. Bottom: Amalgamation is Performed in Nearby Impoundments (bottom left) and the Resulting Doré is Burnt by Traders in Small Charcoal Stoves to Recover the Gold (bottom right).





Child labour exists but to a lesser degree than anticipated. Although some boys and girls were observed at the sites, few were visibly engaged in ASM activities and those involved seem to mainly be carrying out hauling activities. This is consistent with results of household surveys, which indicated that, on average, 1.8 individuals within a household of 5.4 members are economically active, whilst 3.4 household members are above the age of 15 years^{130,131}. Notably, however, only 17% and 19%, respectively, of women and men engaged in ASM indicated that prior to engaging in mining they had carried out another economic activity, suggesting that entry to mining in the area starts early.

Child labour may have reduced in recent years, potentially due to a combination of heightened attention by regulators and efforts to formalise activities, increased awareness of risks of child labour or a combination therein. Indeed, many women miners consulted expressed that ability to pay school fees was one of the most important benefits of their work in ASM.

Figure A36: Few children were observed in mine work and found around work areas, such as those playing on this tailings heap



A5.3. Environmental and Occupational Safety and Health Issues

One of the most significant environmental and OHS issues in the Migori gold mines relates to extensive misuse of mercury in the production process. In terms of these effects, the most significant concerns are highlighted¹³².

¹³⁰ Men are only slightly more likely to be economically active than women (16.7% versus 14.8%) and the ratio of boys to girls below 15 years of age is 1:1.

¹³¹ On average, a Migori household has 2.5 children of school-going age, practically all of which (2.49) reportedly attend school, despite approximately half of households reporting that affording fees is a major concern. (Note: these results are presented for qualitative purposes only as 2.49 of 2.5 children suggests the unlikely event that babies and infants are not present or were not counted in the surveys and results are not statistically significant ($p > 0.05$).

¹³² Estimated for production methods used at Osiri and surround gold mines based on typical mercury losses to the environment for different production methods provided in Veiga, M.M., Metcalf, S., Baker, R. et al, 2006, Manual for Training Artisanal and Small-Scale Gold Miners, GEF/UNEP/UNIDO, UNIDO publ., Vienna, Austria, 144p. Notably, although concentrates are subjected to amalgamation at Osiri, mercury is visibly evident in process water used in sluicing thus some degree of early amalgamation is expected, with excess mercury from sluices largely being collected with tailings from sluices and sold to cyanidation plants.

Cumulative mercury emissions are substantial. Amalgamation is practised on concentrates obtained from sluices. Whilst this marks a significant improvement over amalgamation of whole ores, mercury losses are likely equal to or slightly in excess of gold production. Based on this, it is estimated that approximately 70 kg of mercury per year is emitted from Osiri and approximately 1.2 tonnes of mercury is lost from all sites in Migori County¹³³ in the same period.

The most significant human health risks from mercury is caused by its inhalation during amalgam burning. Although some mercury absorption through skin can occur during amalgamation, the most significant human health issue relates to inhalation of mercury vapour during amalgam decomposition (burning). This takes place immediately outside the doorways of small buying shops although burning within confined spaces (buying shops) is also likely.

Atmospheric mercury emissions from burning are estimated at 30 to 47 kg per year at Osiri and 490 to 765 kg per year across Migori County, much of which likely settles near to burning sites. **The most significant risks are faced, in particular, by traders burning amalgam** as well as gold sellers observing the process and those working in the immediate vicinity of traders (mainly processors).¹³⁴

Women comprise 59% of traders and 62% of processors yet – due to inequalities in education status, access to information and financial capacity, among others – are likely to be less aware of related risks than men but may be more subject to exposure. Given severity of risks to the developing foetus, babies and small children, specific attention on women of childbearing age is warranted.

Longer-term environmental impacts are likely located around gold processing sites but may extend far downstream from cyanidation plants. Mercury amalgamation is largely carried out in small impoundments at gold sites, with a portion of excess mercury retained in process water and 'recycled' within these ponds.

A more serious concern relates to that mercury retained within the tailings recovered from impoundments and sold to 1 of the 10 cyanidation plants in the region. **Mercury and cyanide form a strong complex that can stay in suspension in rivers and watercourses for significant distances prior to its breakdown.** Furthermore, some researchers suggest that cyanide may stimulate growth of the methylating bacteria that prompts conversion of mercury to a highly bioavailable form, methylmercury. Methylmercury is subject to biomagnification in aquatic systems, with most profound risks associated with regular consumption of fish occupying high levels in the food chain (e.g., carnivorous fish).

Most drainages in Migori discharge into Lake Victoria, which **hosts fish stocks of major livelihood, economic and food security significance.** Although the sheer size of Lake Victoria reduces risks of broad health impacts, cumulative impacts of years of mercury misuse in major ASGM areas around Lake Victoria (e.g., Migori in Kenya, Busia and Bugiri in Uganda, Geita in Tanzania) provide cause for concern.

¹³³ Based on a Hg lost: gold produced ratio of 1:1, estimated production at Osiri approximately 71 kg per year and Migori County approximately between 1.06 and 1.5 tonnes of gold per year.

¹³⁴ Estimate based on an amalgam ratio of 60-70% gold to 40-30% mercury and a resulting doré containing 2% residual mercury as drawn from Veiga et al (2006).

Figure A37: (left) Although well-timbered, this shaft is plagued by frequent flooding; (right) Wood used for underground timbering is stacked next to discarded drums used to haul ore from depth



Despite concerns from mercury misuse, the main occupational concern expressed by women and men working in Osiri and nearby gold sites relates to severe risks encountered whilst working underground. These include **fatality or serious injury cause by collapse of tunnels and shafts, suffocation in oxygen depleted areas and drowning due to flooding of workings**. Whilst this risk is mainly borne by men who dominate this activity, repercussions on families left behind can be severe, with one women miner and recent mother recounting how she had to forego her small business and carried out mining full time to sustain her family following the death of her husband.

Additional risks occur during rock breaking (underground by men and during crushing at the surface, mainly by women) and milling. **Chronic dust inhalation can lead to silicosis and other respiratory diseases** (e.g., pneumoconiosis) and cause severe eye irritation whilst flying rock fragments can readily injure and wound workers or even cause loss of vision.

The extent of land disturbance to land is significant in a relatively short time (Figure A38, next page). The changing footprint illustrates both rapid changes in the magnitude of environmental impacts and economic significance common in many ASM areas. This delicate ‘trade-off’ is further explored as local and national economic contributions are outlined below.

Other significant environmental concerns relate to deforestation due to consumption of timbers as needed to secure underground workings and disturbance of the landscapes that can impede future, post-mining land uses or pose current risks to people or livestock (e.g., abandoned pits). Waste volumes can be significant, i.e., approximately 3,700 tonnes of tailings is generated from Osiri per year but subsequently reprocessed at cyanidation plants, which are contained using basic means and at risk of entering nearby watercourses.

A5.4. Distribution of Income and Revenues across the Supply Chain

Param for the calculations of income distribution in the Osiri mine are the following¹³⁵.

- Productivity of the mine: One bag (60 kgs) of ore per day for two miners
- Recovered gold (90% pure) per tonne: 19 g per tonne
- Number of miners on site: 400
- Daily mine production: 12 tonnes ore
- On site gold price (90% pure): KES 3,300 (USD 330) per g
- Working time: Six days per week
- Crushing: fee of KES 150 (USD 1.50) per bag plus 2 bags per day per crusher
- Milling: 20 bags per day per ball mill at a fee of KES 300 (USD 3) per bag
- Sluicing: Five bags per day per team of two at a fee of KES 200 (USD 2) per bag (KES 150 for sluicing and KES 50 for amalgamation)

¹³⁵ Based on gold prices and exchange rates at time of visit (26 and 27 September 2016).

Figure A38: Evolution of Osiri between 2011 and 2014: The environmental footprint has increased as the area's economic significance has grown.



Based on these parameters, the direct mine and processing employment, without including blasters, shaft openers or managers, ascends to approximately 620 persons (+/- 10%) as shown in Figure A39.

Figure A40 shows the average gross monthly revenue per working group individual (note that millers have expenses to perform their service mainly fuel and amortisation of equipment).

Figure A39: Osiri Mine working groups

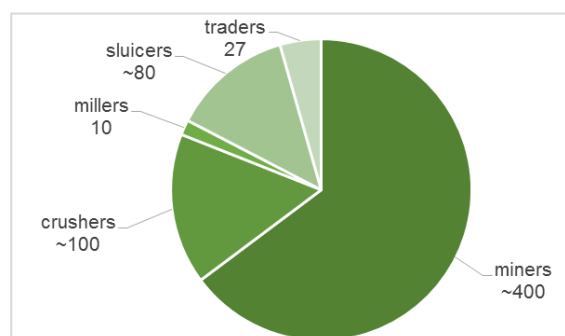
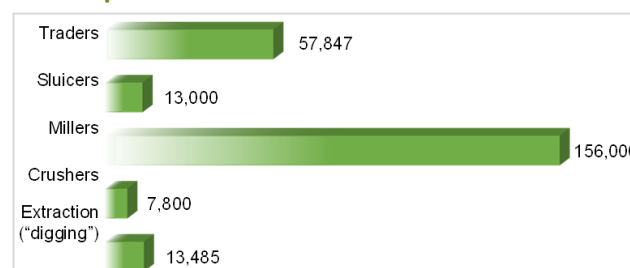


Figure A40: Average gross revenue per individual in KES per month



Blaster and timbering workers' revenues were not assessed. Owners and managers' revenues were not assessed as individual but as a group (see below). Additionally, non-productive mine workers like shaft opener and cleaners are paid on a daily basis of KES 300 (KES 7,800 or USD 78 per month).

One of the ten cyanidation plants in the Migori region, with a nine vat installation with Tanzanian technology and partners, had a KES 5 million investment (USD 50,000), which was repaid in two months. The buying price of tailings paid to sluicing operations was reported as KES 3,750 (USD 37.50) per tonne representing 1.1 g of gold content at 90% purity.¹³⁶

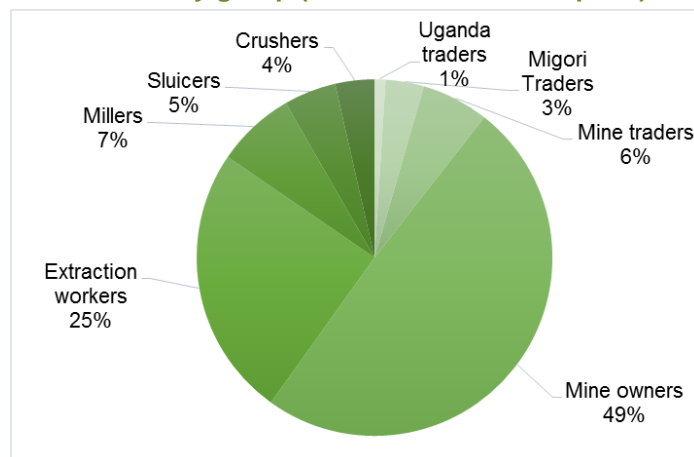
These additional data allow to calculate the distribution of the gross revenue share per group, according to what has been observed in the Osiri mine (Figure 41). The distribution is presented as a percentage of the LBMA gold fixing.

Various conclusions can be drawn from this distribution:

- The selling price in Kampala, the regional gold hub, is around 98–99% of LBMA allowing the Kenyan seller who exported the gold informally from Kenya to repatriate in Kenya up to this amount. Even if exports are informal, foreign currency through the gold sales abroad flows into the Kenyan economy and contributes to its strengthening. **Under this scenario, up to 99% of the value of the gold can return to Kenya and be injected into the economy.**
- Around 50% of the value of the gold goes to miners, processors and mine traders directly, contributing to the local economy. The part of expenses of the mine owners reinjected locally through employment of non-extractive workers has to be added. Consequently, more than two-third of the gold value returns to the manpower on the mine site.
- Direct taxes are absent in the distribution. However, indirect taxes through workers or owner spending (VAT) or fuel consumption significantly contribute to the Kenyan budget. Assuming that 50% of the revenue of the miners, processors and traders and 25% of the owners' revenues are spent in goods and services taxed by VAT, the value contributed to the national budget is near to 6% of the LBMA value of the gold. As a comparison, Kenya tax revenue as a percentage of GDP was 16% in 2012 or USD 8 billion¹³⁷.

¹³⁶ The information corresponds to one of the ten cyanidation plants in Migori region extracted from an interview of its owner.

¹³⁷ World Bank. Kenya Tax Revenues (% of GDP) Retrieved from : <http://data.worldbank.org/indicator/GC.TAX.TOTL.GD.ZS?locations=KE>

Figure A41: Gross revenue share by group (based on London fix price)

A5.4.1. Gender Distribution of Benefits

This division of labour has significant gender implications in terms of the distribution of benefits from working in the mine. Women work in large numbers in many of the lowest paid jobs (e.g., crushing, earning KES 7,800 or USD 78 per month), and are largely excluded from lucrative work in mill operations (yielding approximately KES 156,000 or USD 1,560 per month)¹³⁸. **Women in the ASM workforce yield only 11% of the revenue share despite comprising 38% of the workforce**, mainly due to their dominance in lowest paying jobs (e.g., crushing) and difficulty obtaining more lucrative work. Indeed, about one third of men (35%) in Osiri indicate that entry to the sector was difficult whilst almost half of women (44%) expressed the same.

Although women are also slightly more active in trading than men (59% vs. 41%), far fewer individuals have the resources needed to work in this capacity. Given extensive competition with men for jobs in extraction, harsh working conditions and severity of the risks involved, few women seek work underground and expressed discriminatory beliefs preventing them from doing so. Nevertheless, **only 18% of women miners surveyed expressed a willingness to abandon their job** (compared to 26% of men), suggesting that work in the mines nevertheless provides important economic benefits that are difficult to obtain in other livelihoods.

A5.5. Conclusions from the Migori Case Study

A5.5.1. Economic Aspects

ASGM extraction fuels the local economy through employment and local trading. With an estimated population of 2,000–3,000 people¹³⁹, the Osiri village committee manages more than 50 shops from pharmacies to haircutters, 5 hotels and 37 restaurants¹⁴⁰ contributing to rampant local economy. At the district level, villages like Masara or Kihancha are intensively active also due to ASM activity.

¹³⁸ Notably, prior to the proliferation of ball mills in Migori, grinding was likely carried out manually (e.g., using steel mortars and pestles or grinding stones) and, as found at sites in neighbouring Tanzania and Uganda, may have been previously dominated by women. As found in East Africa and globally, as equipment is introduced into ASM, women are typically less likely to control and benefit from mechanisation and their jobs are often rendered obsolete (Hinton et al. 2003; Hinton 2016).

¹³⁹ Interview with a member of the Osiri mine committee on 27th September 2016

¹⁴⁰ Ibid.

Figure A42: ASM has stimulated a bustling economy in the village that formed immediately around the Osiri Mine (top and centre) that extends beyond the immediate mining area to trading centres and towns that cumulatively benefit from gold mines across Migori County (bottom)



Based on the above estimation that 2/3 of the gold produced in Osiri is spent locally, this means that **KES 187 million (USD 1.9 million) are locally injected from ASM mineral extraction**. The treatment of tailings, recently in expansion with the use of Tanzanian technology, adds an additional 32 kg of gold from the Osiri mine with a local value of KES 117 million (USD1.2 million)¹⁴¹, with 10 processing plants employing a significant number of people.

¹⁴¹ Supposing conservatively that the actual amalgamation process leaves behind 40% of the gold and that 75% is captured by the cyanide chemical process.

At the Migori district level, local spending from ASGM production is significant. The number of miners and processors are reported (by different individually credible sources) between 3,450 and 16,200 people averaging 9,825 people¹⁴². The calculated district's annual production of gold is approximately 1.06 tonnes¹⁴³ (9 g of gold per month per miner and or processor) and 1.5 tonnes according to a regional trader. Estimating that two-thirds of the production is locally spent, and based on an average of 1.3 tonnes for every 10,000 miners, **the impact of ASGM in the district in terms of local spending is in the order of USD 37 million**. This amounts to an important percentage of the total economy of the district.

When the numbers are extrapolated at the country level¹⁴⁴ (on the base of 40,000 artisanal and small-scale gold miners), the incurred gold production would amount to 5.2 tonnes or USD 224 million or 0.35% of the country's GDP.

As a comparison, the #1 mineral mining activity of the country, the titanium sands extraction, generated sales for its fiscal year 2015-2016 for USD 123 million and employed 922 persons¹⁴⁵ contributing to the state budget in 2015 KES 298 million in royalties (USD 3.1 million) and AUD 40,000 (USD 29,000) in income tax.

Comparing the 'social intensity' of ASGM with titanium sands extraction, in terms of the number of direct jobs per value created, USD 1 million of value created directly employs almost 8 workers when for the same value created by the ASGM sector directly employs almost 180 workers: a 1:23 ratio.

The contribution of the titanium sands sector to the state budget in royalties and income tax represents 2.5% of the mineral value. ASM indirectly generates through VAT spending, a minimum of 6% of its mineral value. Then, **in comparison to the titanium sands sector, the first mining contributor in Kenya, ASGM sector generates 1.8 more revenues, more than 40 times in employment and, even despite its informality, it indirectly contributes to the national budget at a higher rate through VAT**.

In conclusion, although informal, ASGM has significant social and economic impacts in Kenya - even indirectly contributing through the extracted minerals. However, urgent formalisation policies are needed. With three out of four workers informally employed,¹⁴⁶ the cost of keeping the sector in informality is high, particularly when environmental, occupational and social impacts are considered.

A5.5.2. Environmental and Occupational Aspects

One of the most significant environmental and OHS issues in the Migori gold mines relates to **extensive misuse of mercury in the production process**. Amalgamation is practised on concentrates obtained from sluices, which marks a significant improvement over amalgamation of whole ores, but mercury emissions are substantial, estimated at more than 70 kg per year of mercury emitted from Osiri and more than 1.2 tonnes of mercury lost from all sites in Migori County.

The most significant human health risks from mercury is caused by its inhalation during amalgam burning. Greatest risks are faced by traders burning amalgam and to a lesser extent as well as gold sellers observing the process and those working in the immediate vicinity of traders (mainly processors). Due to mercury absorption by and potential impacts on the foetus, pregnant women and women of childbearing age warrant specific attention. Women comprise 59% of traders and 62% of processors yet, mainly due to inequalities in education and access to information they are likely less aware of related risks than men. Atmospheric mercury emissions from burning are estimated at 30–47

¹⁴² Estimation from the Project team. The variation stems from seasonal fluctuation, but also from a varying understanding of the term 'miner' by different stakeholders.

¹⁴³ During the interview of a well-established regional trader, the district's annual gold production was estimated at 1,5 tonne.

¹⁴⁴ This would suppose that the non-assessed artisanal and small-scale mines are similar to the Osiri one.

¹⁴⁵ Base Resources 2016

¹⁴⁶ UNECA 2015

kg per year at Osiri and 490–765 kg per year across Migori County, much of which likely settles near to burning sites¹⁴⁷.

Cyanidation of mercury-bearing tailings is a serious environmental and human health concern.

Mercury retained within the tailings sold to one of the 10 cyanidation plants in the region can, if discharged into rivers and watercourses, stay in suspension for long distances. Due to biomagnification within aquatic food chains in particular, mercury can accumulate within tissues of carnivorous fish, affecting those that regularly consume species at higher levels in the food chain. The area hydrology, location and nature of fish stocks relative to drainages from gold processing sites and (to a greater extent) cyanidation plants and their waste management practices requires more in-depth evaluation to ascertain the extent of these risks.

Despite concerns from mercury misuse, the main occupational concern expressed by women and men working in Osiri and nearby gold sites relates to severe risks encountered whilst working underground. These include **fatality or serious injury cause by collapse of tunnels and shafts, suffocation in oxygen depleted areas and drowning due to flooding of workings**. Additional risks occur during rock breaking (underground by men and during crushing at surface, mainly by women) and milling. **Chronic dust inhalation can lead to silicosis and other respiratory diseases** and cause severe eye irritation whilst flying rock fragments can readily injure and wound workers or even cause loss of vision.

Other significant environmental concerns relate to deforestation due to consumption of timbers as needed to secure underground workings and disturbance of the landscapes that can impede future, post-mining land uses or pose current risks to people or livestock. **The extent of land disturbance to land is significant in a relatively short time** (Figure A38). The changing footprint illustrates both rapid changes in the magnitude of environmental impacts and economic significance common in many ASM areas.

Environmental and health risks associated with mercury misuse are significant. However, over two decades of experience in tackling this issue via policy, legal, trade, technical, organisational and other approaches provide significant guidance for addressing this issue.

A5.5.3. Social and Gender Aspects

Mining is, by far, the **main source of employment in Osiri**, employing 78% of individuals within the surrounding area. Furthermore, area residents and miners value ASM as a livelihood, with most miners (78%) preferring to continue work in the mines and most (77%) contend that miners' incomes exceed those obtained from other livelihoods. Despite perceptions of the 'young men spending all earnings on alcohol and women', many miners interviewed (both women and men) cited numerous benefits ranging from acquisition of land, to investment in small shops, improvements to their homes and payments of school fees.

Only 22% of economically active individuals have education above primary school levels and less than half of households are likely to own medium- or large-sized livestock (e.g., cattle, goats). More than 90% of households do not have piped water or gas or electric stoves (indicating reliance on charcoal) and 56% of households lack mobile phones. Given relatively low education levels, relatively high levels of poverty and limited access to better-paying alternatives, **ASM is a logical, reasonable choice for thousands of men and women engaged in ASM**. Few men and fewer women (26% and 18%, respectively) are willing to abandon work in the mines, suggesting that benefits of ASM largely outweigh the costs, particularly if compared to other opportunities available to them.

Although **women comprise 38% of the ASM workforce, they yield only 11% of the revenue share**, mainly due to their roles in lowest paying jobs (e.g., crushing) and resulting difficulties in obtaining capital needed to gain access to more lucrative jobs (e.g., sluicing). Although a response is clearly needed to rectify these inequalities at ASM sites, disparities in assets of households headed by men compared to those headed by women exist but are not as substantial as expected. For instance, the difference between men- than women- headed households who own medium- and large-sized livestock is only 8% and difference for bicycles and motorcycles only 8%.

¹⁴⁷ Estimate based on an amalgam ratio of 60-70% gold to 40-30% mercury and a resulting doré containing 2% residual mercury as drawn from Veiga et al (2006).

Reasons for this may be linked to women's domination of work in general trading, where they constitute 65% of the workforce. With an estimated population of 2,000 to 3,000 people¹⁴⁸, the Osiri village committee manages more than 50 shops from pharmacies to haircutters, 5 hotels, and 37 restaurants¹⁴⁹, contributing to a bustling local economy. **KES 187 million (USD 1.9 million) are locally injected from ASM mineral extraction.** Based on Osiri Village alone, an economic multiplier of 3.8 spin-off jobs for every job in mineral production was estimated¹⁵⁰. This benefit may extend to mining communities across Migori which yield significant benefits from the ASM economy.

Despite this, **the direct benefits of ASM disparately accrue to men, whilst women and girls seem to bear a disproportionate burden of negative impacts.** Dis-benefits largely relate to women's and girls' domestic roles, including in meeting food security needs of households, which can be impacted by landscape degradation or dust and pollution from mining affecting their capacity to grow food crops. This can also relate to women's and girls' and in roles in caring for the ill and injured family members, including men working in extraction facing high risk of collapse and babies and children potentially impacted by mercury in utero. Where women have little say concerning decisions that affect them (for instance, related to use of proceeds from ASM or sale or use of land) impacts may be even more profound. Lack of women's participation in ASM organisations, local government, and other associations additionally play a role.

Finally, although little evidence of child labour was observed or reported during assessments at Osiri and neighbouring sites, **child labour likely exists and is most pronounced in more informal areas.** Surveys indicate that of 5.4 household members, only 1.8 are economically active although 3.4 are above the age of 15 years. In fact, many women miners, in particular, indicated that payment of school fees was one of the main reasons for their work in the mines. These findings, however, do not preclude child labour in Osiri and, in particular, less formal ASM areas.

Figure A43: As found across Migori County, ASM Largely takes place alongside and adjacent to farming



A5.6. Recommendations for the ASGM Sector

Lower royalty rate to attract ASGM into the formal sector. The challenge for the country is to formalise the sector. If formalisation starts through trade, it will allow the government to understand the volumes produced whilst acting on the ground with formalisation plans. At present no ASGM is subject to royalties given that all the ASM is smuggled out of the country. Setting an adequate rate, lower than 2%, could quickly attract some volume to the formal sector when the conditions are still competitive versus informal exports. The royalty payment should be transferred from the producer to the exporter or final trader.

¹⁴⁸ Interview with a member of the Osiri mine committee on 27th September 2016.

¹⁴⁹ Ibid.

¹⁵⁰ This multiplier is based on the village immediately within the mining and accounts for economically active aged residents relative to mine workers. Given that miners expenditures undoubtedly reach.

Establish traceability in the ASGM supply chain. Introducing traceability in the supply chain is an obligation of the government given that Kenya is a member state of the ICGLR and Kenyan gold is subject to the DDG. Additionally, having the ability to trace the origin of the gold will allow targeted action plans in the region, counties and districts where gold originates.

Formalise ASM miners' and processors' activities. A small flat income tax could also be introduced (0.5–1.0%) and levied together with the royalty that could be deducted at time of export or final sale. Even a social contribution levy could be implemented and levied together with the royalties and income tax. Each mine worker could have a fiscal and/or social identification number that will be indicated at time of sale to authorised traders. Final traders, the exporters, will have the responsibility to pay this collected flat income tax and contribution to the government.

Introduce established measures to minimise, manage and mitigate risks from mercury misuse using gender-sensitive approaches. Suitable technical responses to minimise mercury use and improve its handling and management, including under programmes such as GEF GOLD, and could be introduced in conjunction with formalisation efforts in Migori. These include sensitisation campaigns coupled with introduction of retorts, more efficient gravity separation methods and waste containment systems. Given the gender division of labour in these sites, any proposed approach should be subject to a gender impact assessment to ensure any interventions mitigate predictable negative impacts on women and address rather than exacerbate gender inequalities¹⁵¹.

Respond to priorities expressed by both women and men miners including via training programmes and creation of financing mechanisms to address those associated with underground mining (instability, ventilation, flooding), chronic dust exposure and labour intensive crushing as well as improved access to information concerning gold prices and markets. Establishment of basic, simple organisational policies, codes of conduct, and rules (environmental, occupational, and labour related) with gender mainstreamed throughout could help address a multitude of issues identified herein.

Prioritise women's participation and training, including within formalisation efforts to address inequalities at ASGM sites including via leadership and advocacy training and business skills and entrepreneurship development, the latter of which may require support for basic literacy and numeracy. Piloting of the establishment of 'mining desks' in local women's trust banks, which currently see loans to miners as a high-risk venture, and establishment of savings groups (e.g., SACCOs) have been shown to effectively support empowerment of women in ASM areas.

¹⁵¹ For example, any alternative processing methods (e.g., improved sluice boxes, shaking tables) must be introduced such that women (who currently dominate processing activities except for mechanised milling) do not lose their livelihoods and yield greater benefits from new methods.

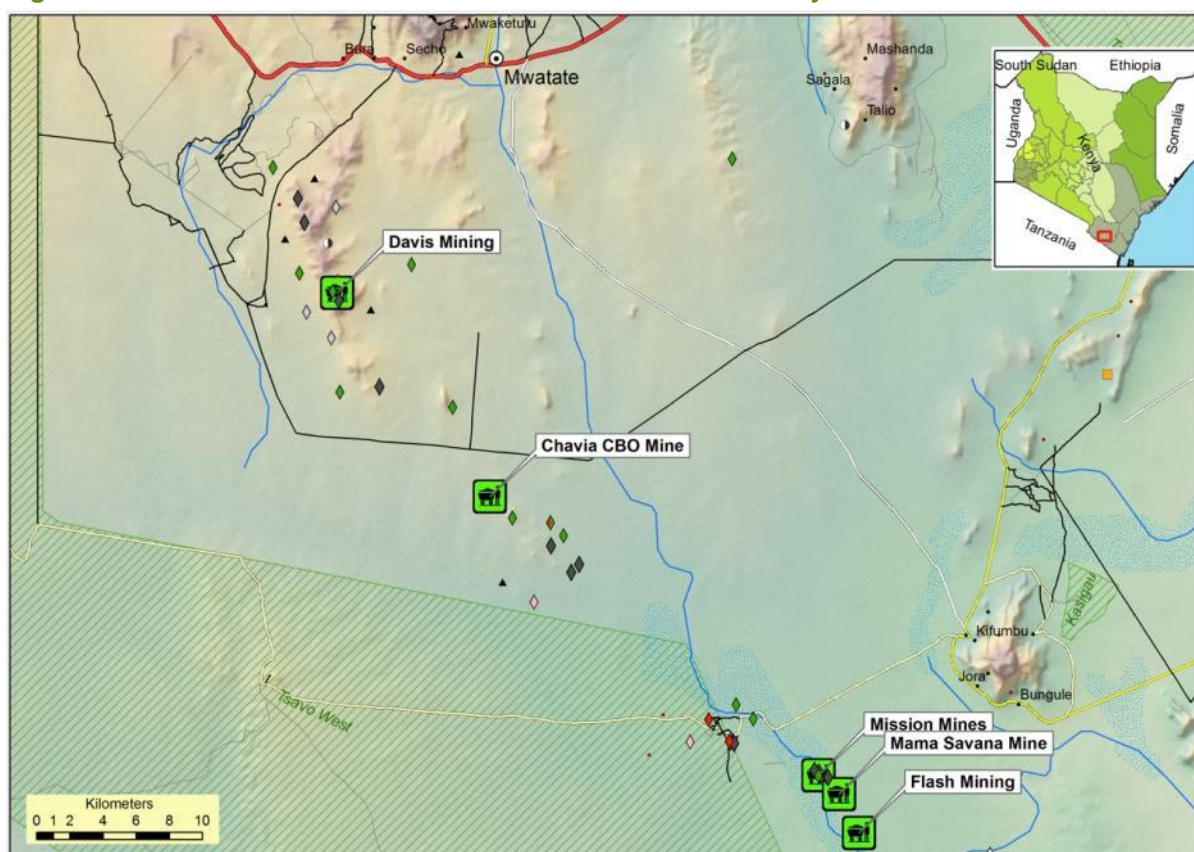
Annex 6: Detailed Case Study: Taita Taveta

A6.1. Area Overview

Kenya is well known for gemstone mining and over 60% of annual national production is attributed to ASM. This section summarises the sector in Taita Taveta County, one of the country's main gemstone producing areas. Located within a gemstone belt that spans Kenya and Tanzania, the county produces high and middle value gemstones including: green and red garnets, ruby, blue and pink sapphires, green and yellow tourmalines, rhodolites, and kyanites¹⁵². The most lucrative of these is the rare green garnet Tsavorite, named for the area where it was discovered in Taita Taveta. **As the main global source of Tsavorite, Taita Taveta County is uniquely positioned to establish a signature gemstone market** with significant development potential through support to ASM. As described herein, achieving such an aim will require a complex, multi-faceted approach.

During the course of research, five mining areas were visited where consultations and interviews with local stakeholders took place, in addition to interviews with traders, mining association and cooperative leaders, mining authorities and local leaders in Voi and trading centres around mines in Mwatete and Voi Subcounties.

Figure A44: Location of mine sites visited in Taita Taveta County



A6.1.1. Livelihoods, the Local Population, and Environment

Livelihoods, economic potential and the natural environment are inextricably linked in Taita Taveta. The landscape is diverse, from hot, arid plains to steep mountains, with elevations ranging from around 300 m to 2,200 m and contrasting variations in climate (with rainfalls varying from 440 mm in lowlands to 1,900 mm in the Taita Hills)¹⁵³. The area is expansive, extending to 17,084 km², although

¹⁵² Pohl & Horkel 1980, Horkel et al. 1984.

¹⁵³ Taita Taveta Local Government, 2013.

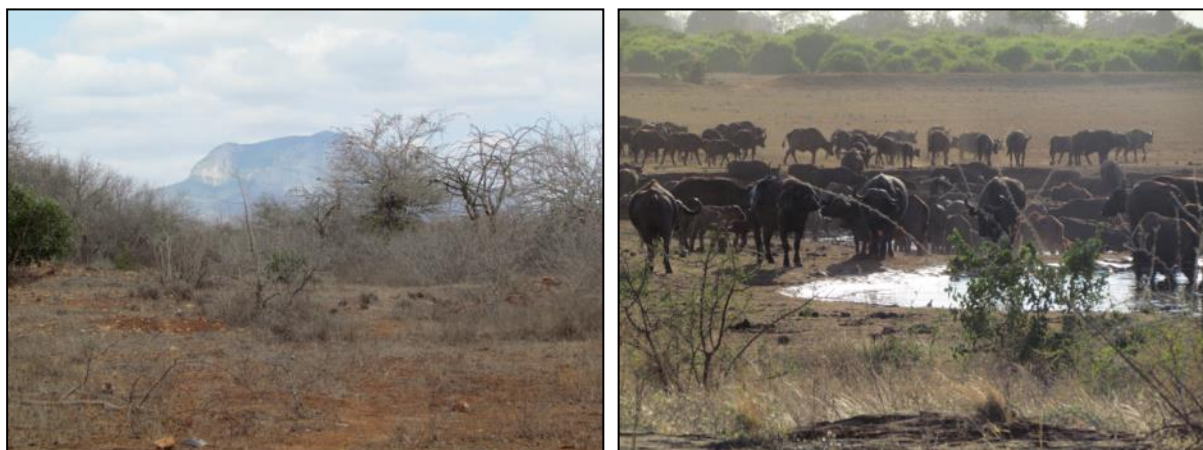
only 12% is arable and 62% is covered by two national parks (Tsavo East and Tsavo West)¹⁵⁴, providing constraints to the diversity of livelihoods and land uses available to the population. This is further impacted by 773.4 km² coverage of 28 ranches (8 of which belong to the Government of Kenya, 11 privately owned and the remainder belonging to groups of users) and large areas occupied by three commercial sisal estates, which average 7,400 ha each¹⁵⁵.

Figure A45: A diversity of gemstones of Taita Taveta displayed at a trader’s office



Under these conditions, the primary livelihood options for the population of more than 320,000 include livestock rearing, subsistence farming, and work within the ASM sector, with additional employment in small business, public service and, to a much lesser extent, work for larger companies (in mining and sisal production)¹⁵⁶.

Figure A46: (Left) The arid savannah and bushland against a backdrop of Steep Mountains; (Right) Buffalo at a watering hole in Tsavo East National Park



¹⁵⁴ Ibid.

¹⁵⁵ Ibid.

¹⁵⁶ In 2009, the national census reported the County population as 284,657, and a projected 2015 population of 329,381 (168,169 males and 161,212 females). Source: Taita Taveta Local Government, 2013, The First Taita Taveta County Integrated Development Plan 2013-2017, Report to Government of Kenya, 104p.

In two of the most gemstones reliant subcounties, Mwatate and Voi, **ASM provides the main source of employment for 57% of women and men** of economically active age, well above agriculture (39%), trading (35%) and other activities. Agriculture is often practised alongside mining and was identified as a source of livelihood for 20% and 25% of men and women, respectively, whilst 40% of men and 21% of women participate in mining, and 31% of women and only 9% of men participate in some form of trade. (Figure A47)

Gemstone activities are situated across the same plains that extend into Tsavo East and West National Parks, and elephants, giraffes, lions, zebras and various species of antelopes, among other wildlife, are reported in some mining areas. Many of these animals roam within expansive fenced ranches, such as Kishushe and Oza¹⁵⁷, which are mainly used for livestock grazing although many also operate as wildlife reserves for tourism.

Although some gemstone production occurs on communally owned land, the majority of production sites are also located on ranches, where entry and exit to the area and related approvals to work is often controlled by ranch owners and managers.

For instance, although Kasegau Ranch mainly enables access to grazing land for its 2,200 members, it is also home to approximately 10 mine sites are found across the area, with the 4 active sites reportedly employing up to 700 workers.

A6.2. Supply Chain Actors, Activities, and Costs of Production

A6.2.1. Economic Relations at Mine Sites

Different types of gems are traded along the supply chain of gem AM. According to official export permits, the most traded gem in value, is tsavorite, followed by tourmaline, zoisite (tanzanite), garnets (excluding tsavorite), opal, sapphire and ruby as the seventh most traded. In Taita Taveta County, the most mined stone, in value, is tsavorite followed by tourmaline or ruby¹⁵⁸.

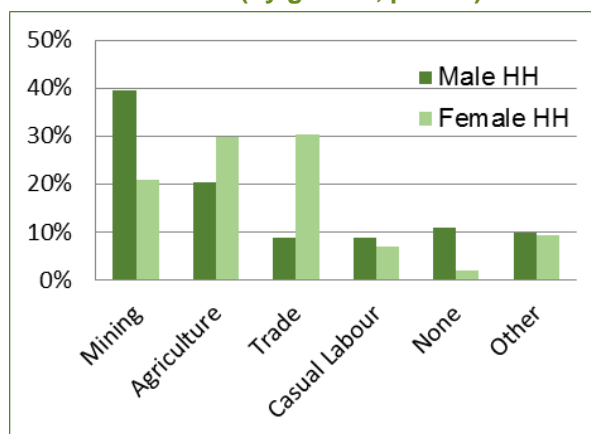
The supply chain involves different stakeholders at mine site and along the trading chain.

In Kasighau region, four different stakeholders groups could be identified¹⁵⁹:

- **Landowners:** the community that owns a piece of land (a 'ranch')
- **Cooperative or company:** they own the mineral rights and are accountable before the authorities
- **Pit owners or sponsors** who finance the extraction
- **Miners**

The basis of the economic relations between supply chain actors is production sharing. Landowners (the community), take a 10% share of the CBO Chawia Minerals Cooperative production plus a toll charge to every vehicle entering the ranch to finance the security of the entrance gate¹⁶⁰. They also charge mining companies/cooperatives and some pit owners a fix amount of KES 50,000 (USD 500) per year¹⁶¹. The total annual fixed levies for the use of the land to the community totals KES 200,000

Figure A47: Livelihood activity of economically active individuals (by gender, p<0.05)



¹⁵⁷ Mghanga 2011 [P; OBS, baseline]

¹⁵⁸ According to field interviews with traders and miners.

¹⁵⁹ Based on information collected during a field visit in Kasighau region where different mines were visited.

¹⁶⁰ According to the CBO management.

¹⁶¹ According to the interview of the chair of the community/landowner, no levy is taken on production.

(USD 2,000)¹⁶². The CBO Chawia Minerals cooperative takes a share of 25% of the production. Sponsors, who are pit owners investing and paying the miners, take the rest of the share, 65%. They sell the production together with the cooperative in order to have a balanced distribution of the revenues.

Exceptionally, one of the mining companies operating in the community ranch, Flash Mining Co., pays miners either on a production share basis (30% for tourmaline and 20% for tsavorite) or on a fixed basis of KES 10,000 (USD 100) per month. The company employed 16 workers at the time of the visit.

A6.2.2. Economic Relations After the Mine Site

Trading of gemstones in Kenya is complex and it is, in its vast majority, informal. Different types of trades occur in Kenya.

Medium size companies sell their production to international traders or export it directly. Most of the gem production is sold to local traders by producers. Quality stones are mostly sold to local traders who later resell the stones to exporters in Nairobi or Arusha. Some of the best pieces are directly sold in Asia or Europe. Good quality tsavorite is also sold to Sri Lankan buyers in Voi. Low quality and small gems are sold to Indian traders active in Voi who informally export them. Mine site traders also exist trading directly with individual miners and mainly reselling in Voi.

Any Kenyan gemstone trader needs a licence to operate. The cost of the licence to sell nationally is KES 20,000 (USD 200) per year and KES 350,000 (USD 3,500) if the trader exports directly. Gem exportation requires a permit that is issued by the Ministry of Mining in Nairobi on every international shipment.

Only a small part of the Kenyan production is locally cut and then exported. The cutting industry in Kenya is small and cutting skills have been low for a long period of time. Cut gems represent 66% of the official exports (for a value of KES 3.1 million in 2015). However, this percentage does not reflect the reality of the exports; the majority of the gemstones are believed to be exported in rough. The reason for being the majority of the exports is because they benefit from a low royalty (1% vs. 5% for rough stones), confirming that a low royalty is an effective formalisation tool. Tsavorite because of its high value¹⁶³ accounts for the majority (83%) of the cut stones officially exported. Tsavorite was known only to mineral specialists until 1974, when Tiffany and Co.¹⁶⁴ launched a marketing campaign which brought broader recognition of the stone¹⁶⁵ and helped propel it to the fine jewellery¹⁶⁶ range of products. It is believed that its major exporter is the company Lapigems¹⁶⁷, which integrates a cutting workshop. In Arusha there is a significant gemstones cutting sector, more developed than in Kenya. Cut gems also benefit of a reduced royalty of 1% in Tanzania. This attracts a significant part of the rough gems extracted in Kenya.

The gemstones market is different to the gold one. It is an over-the-counter market where there is no international quotation. Quality of the product importantly affects its value. Valuation of rough gemstone requires special skills, practice and background, and cannot be performed as easily. Gemstones buyers are not as common as in gold where potentially every jeweller can make an offer using the touchstone evaluation method. This market's complexity allows traders to have more commercial power, especially in an informal market where transactions take place in secret. As a consequence, traders margin is as high as 100% of the buying price (also because of the high risks assumed by the buyer on the final quality)¹⁶⁸.

¹⁶² According to the chair of the community/landowner.

¹⁶³ Prices of a Tsavorite can vary from 1 to 100 depending on purity, colour and size.

¹⁶⁴ https://en.wikipedia.org/wiki/Tiffany_and_Co

¹⁶⁵ Idar-Oberstein, International Colored Gemstone Association

¹⁶⁶ http://www.fameo.co.uk/fine_jewellery.html

¹⁶⁷ See lapigems.com.

¹⁶⁸ The trading margin is not surprising. Trading margins in gemstones always depend on the characteristics of the gemstone (i.e., the risk that a certain rough stone can be turned into a cut stone of the anticipated value). Gemstone appraisal requires gemmological equipment and a lot of experience specially when not cut, which trader at mine sites do not have. Traders consequently buffer this risk by a higher trading margin. However, their profession is still fraught with risk: higher level downstream traders only 'pick' the best stones, and the low quality material has to be sold off at a discount price. Therefore a 100% mark-up on some stones may not be as lucrative

A6.2.3. Mineral Production Methods and the Gender Division of Labour

Whilst many miners in Taita Taveta continue to rely on alluvial mining and similar near-surface methods are used for prospecting for minerals, as the sector has evolved over the past five decades, activities currently focus on higher grade primary sources and most activities commence with surface (open pit) mining and rapidly shift underground, with subsequent processing relating to less labour intensive separation and sieving, washing and sorting prior to sale.

Total direct employment across Taita Taveta County is estimated at approximately 5,000¹⁶⁹, of which 85% of the total workforce is comprised of men and 15% are women and approximately 2,700¹⁷⁰ of which are associated with companies, cooperatives or associations. As shown in Figure A48, a distinct gender division of labour exists in Taita Taveta, which has implications in terms of gender distribution of benefits from ASM in the area.

Extraction

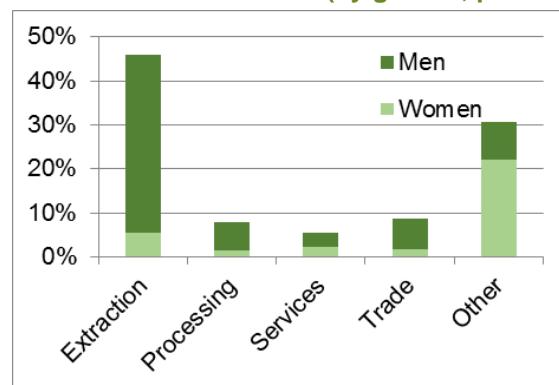
Men constitute 88% of the extraction workforce, wherein miners work in small teams of 3 to 8 and work to depths of more than 50 m, in some cases within a gallery of connected tunnels that extend laterally for 100 m or more. Activities range from completely manual (artisanal) to somewhat mechanised (small scale), the latter of which is likely to be organised (e.g., as an association or company) that possesses some form of formal approvals from ranch or land owners and mine authorities.

In many cases, excavators are hired to remove overburden (some of which may consist of gemstone-bearing ore) prior to commencement of underground operations. Although trends in orientation of mineralised zones may be known across tens of km and provide (together with promising prospecting results at surface) an indication of where to commence operations, **just a few days or several weeks or months of mine development can take place before (and if) gemstone bearing veins and reefs are encountered.**

Consequently, some form of financing is required as costs can reach tens of thousands of dollars in labour costs, equipment (e.g., water pumps, compressors, jackhammers) and supplies. Under extremely arid conditions found in many sites, sites must rely on water purchased from a water truck. In some cases, some form of cost sharing often takes place, wherein workers are provided with very basic housing and food but do not receive a cash payment for work until ore-bearing material is reached. In other cases, some costs such as water, security, excavator rental and licence fees may be shared with the licenced entity (e.g., a CBO that acts as an umbrella organisation and buyer authorising and overseeing activities of pit owners).

Particularly when investment is prolonged for months or miners fail to encounter lucrative ore, this arrangement is cause for much frustration and often impoverishment of both workers and investors, often resulting in out-migration of workers to more lucrative sites and severe debts to investors.

Figure A48: Division of labour in Taita Taveta Gemstone Mines (by gender, $p < 0.05$)



as it appears at first glance.

¹⁶⁹ Reportedly, up to 10,000 miners are active across Taita Taveta, however, prices for many gemstones have declined by approximately 50% and many sites are inactive due to lack of production and/or financing.

¹⁷⁰ Anyona & Rop 2015b; Anyona & Rop 2015a.

Figure A49: Considerable investment is required to access deeper and potentially more lucrative deeper deposits, including (left) rental of excavators to follow promising shear zones from the surface; and (right) large generators needed to power jackhammers and other small equipment



Similar financial challenges may be encountered during production, where promising indicator minerals and gems (e.g., comparatively low-value yellow tourmaline) may be encountered and worked, alluding to potential but not proven reserves of green garnet (tsavorite) at depth, or one or more high-yielding pockets may be encountered with little production to follow. At one site where only 1 of 8 pits belonging to a single CBO owner were active, approximately 130 pits had been abandoned by different owners due to absent or depleted reserves and lack of resources needed to continue work.

During development/preparation, although extraction in some sites is highly manual, development at most sites is in hard rock, requiring drilling using jackhammers and blasting with explosives, thereby presenting a constraint for many working at artisanal levels. Where blasting takes place, common practice is for all personnel to exit underground workings until dust and gases clear. One site was conducting 2 blasts per week, yielding approximately 10 tonnes of broken rock per blast. Timbering to stabilise underground workings seems to be extremely limited. Material is removed by workers using buckets or sacks.

During extraction, because jackhammers (and to a greater extent) blasting can severely damage gemstones resulting in losses to all parties, at many sites manual rock breaking is heavily relied upon once gemstone-bearing material is encountered.

The **rate of ore production varies greatly** depending upon the equipment used, number of workers and active tunnels and hardness of the rock. One site relying solely on jackhammers, for example, advances at approximately 2 m per day in a single tunnel using a crew of 5 men including 2 jackhammer operators who yield approximately two hundred 25 kg sacks of ore per day. By comparison, at another site, 2 miners working manually were advancing their tunnels at approximately 1 m per day. Typically, extraction is carried out for 7 to 8 hours daily. Grades vary significantly. At one site, 30 tonnes per week of rock broken via blasting yields approximately 3 kg of ore bearing approximately 90 to 100 g of tsavorite valued at approximately KES 10,000 per g (USD 100 per g).

Mineral Processing

Limited processing is required during gemstone production. As such, only 8% of the mining workforce (including those in extraction, service provision and related activities) is engaged in this phase of activities, only 19% of which are women.

Activities mainly involve sifting through and sieving ore obtained from sacks and hand-picking of visible gems, often carried out by or under the watchful eye of owners. Gemstones are washed with water and sometimes treated with glycerine prior to sorting according to type, size and quality.

Few traders carry out in-house cutting and polishing within the County. In one case, a gemstone cutter with 14 years experience in Mombasa was employed and paid a salary to work approximately 7 hours per day, enabling him to cut 8 to 10 pieces daily.

Figure A50: (left) Rough stones produced from one of the small, semi-mechanised operations; and (right) one of the few demstone cutters in Taita Taveta



A6.3. Distribution of Income and Revenues Across the Supply Chain

Gem mining is a key economic contributor in Taita Taveta County. Whether individually or through cooperatives or companies, the extraction of gems is labour-intensive activity requiring to be manually performed through artisanal to small-scale methods. Consequently, the activity has high social impact in the county.

However, the sector is characterised by informality, conflicts over land endowed with minerals, unavailable information, secrecy along the supply chain and smuggling of the majority of the production¹⁷¹.

Official export permits granted by the MOM in 2015 amount a record of 984 operations, totalling USD 4.7 million¹⁷². The KRA reported for the same year only USD 2.6 million on gems exports. A rapid analysis of the exports permits value shows that:

- More than 50% of the gems export permits are for tsavorite
- 93% of the exports come from 5 gem types (tsavorite, tourmaline, zoisite, garnets, and opal)
- 2/3 of the exports were cut stones which royalty is 1% versus 5% for rough gems
- Less than 1% of the tsavorite was exported rough
- Tourmaline exports were 98% made in rough stones
- More than 87% of the exports permits were exclusively sourced from Taita Taveta County
- 63% of the exports permits were granted to U.S. traders, 14% for India, and 13% for Hong Kong

The gem-cutting industry is very reduced in Kenya. The proportion of cut gems official exports does not reflect the reality on the ground. We estimate that the official export permits represent only 5% to 10% of the reality¹⁷³.

The majority of formal exports are cut gems. Statistics show that a low royalty, 1% for cut gems vs. 5% for rough ones, has been an effective formalisation tool attracting trading to be done through formal means.

The number of miners in the extractive and processing sector in Taita Taveta approximates 10,000¹⁷⁴. Half of those miners are employed by companies and paid on a production share basis that varies

¹⁷¹ These circumstances did not allow the team to gather sufficient information in order to assess the economic and social impacts of the sector based on the mine site assessments. In other words, it made it difficult to build a bottom-up approach to evaluate the sector.

¹⁷² MOM source.

¹⁷³ Also given that the error margin is high and due to the impossibility to assess the sector from the mine site visits (bottom-up approach), we have to perform it with a top down approach.

from 20 to 30% of the extracted gems. The other half of the workers extract independently. They normally get one third of the extracted gems. Consequently, the average miner share in the production would be 30%.

Miners' monthly revenues amount KES 15,000 (USD 150) per month¹⁷⁵. Based on the 30% share in the production, the annual local value of extracted gems per miner amounts KES 600,000 (USD 6,000). By assuming that traders generate a 100% markup on the gems, the national market value of the production for 10,000 miners sums up to KES 12,000 million (USD 120 million)¹⁷⁶.

A6.3.1. ASM Gemstones Income and Distribution

The national market value of gems was approximated at USD 120 million. This amount is distributed as follows:

- USD 60 million is absorbed by traders
- USD 20 million for the 10,000 miners
- USD 20 million for the landowners and cooperatives
- USD 20 million for investors/sponsors

Considering that half of the miners' revenue is spent in VAT taxed goods, an estimated USD 1.6 million from Taita Taveta County gemstones sector is indirectly captured by the Kenyan budget. This amount is much higher than the USD 96,000 estimated royalty (based on the export permits granted in 2015)¹⁷⁷. This comparison allows to conclude that the collection through tax is higher than through royalties. By optimising the miner's revenues, the indirect VAT generated will contribute much more than by tightening the control of exports.

A6.4. Environmental and OHS Issues

The nature and severity of environmental and occupational risks in Taita Taveta's gemstone mines is closely tied to water scarcity. **Most gemstone mining takes place in the arid plains mainly comprised of savannah and bushlands where water resources are limited and therefore sensitive to disturbance in terms of quality and quantity.** The county population is served by a number of rivers (Tsavo, Lumi, and Voi rivers) and springs, but most ASM sites rely on water purchased from water trucks. Most concerns and issues, therefore, relate to groundwater.

Some gemstone deposits may introduce deleterious elements (e.g., arsenic, radioactive elements) into the environment and such elements can mobilise into groundwater systems (and to some extent surface watercourses) particularly with seasonal rains. In the absence of geochemical testing, such risks cannot be ascertained but, given low rainfalls, are likely to be limited. Similarly, given the vast area over which gemstone mining takes place and small scale of activities, cumulative effects of water table drawdown associated with pumping is similarly likely to be limited.

Lack of water does, however, provide serious occupational risks, mainly associated with dehydration and sanitation related diseases. Additional risks occur during rock breaking, particularly where jackhammers are used without water. **Chronic dust exposure can lead to silicosis and other respiratory diseases** whilst flying rock fragments can readily injure workers or cause loss of eyesight.

Conversely, **water scarcity can reduce risks associated with underground instability and resulting tunnel collapses.** Nevertheless, as most ore-bearing reefs are found within shear zones, influx of ground water may be encountered in some sites (wherein sloughing of rock and potential collapse is more likely), but flow rates in many localities are reportedly not high enough to pose concerns for flooding. Where available and necessary, water pumps are employed.

¹⁷⁴ The number was consistent in the interviews with Davis Mining directors (Daudi Osman and Ayub Ashraf Khan) on 2 October 2016, Taita Taveta County Regional Mining Director Edward Omito (MOM) on 1 October 2016, Antony Zagoritis director of Lapigem on 5 October 2016.

¹⁷⁵ The number is in line with gold miners in Migori County.

¹⁷⁶ The international value of the production could not be assessed because of the total secrecy and informality around the supply chain.

¹⁷⁷ MOM collected data.

Given the hardness of host rock (e.g., competent limestone, feldspar), timbering is far less common and some sites leave pillars of rock in place between tunnels and adits in order to maintain stability. As forest resources in Taita Taveta are limited, **consumption of timber seems to be limited** although that which is consumed (including for construction of camps) may cumulatively impact on this sensitive and biodiverse environment. Further to this, given the prevalence of wildlife coupled with poverty levels in particular in most remote and impoverished sites, the risks of impacting biodiversity through bushmeat hunting and potentially poaching is high.

Important occupational risks also relate to insecurity. Many miners travel frequently great distances to camps in largely unpopulated areas often on foot or by bicycle. En route to and from sites and whilst in the camps, **mine workers may be subject to attack and potentially even sexual assault**. This risk is likely most pronounced for women miners and may be one factor limiting their participation, but (as found in other localities) may also pose risks for vulnerable men.

Figure 51: Land disturbance caused by one mining operation and remote location of many sites are visibly evident

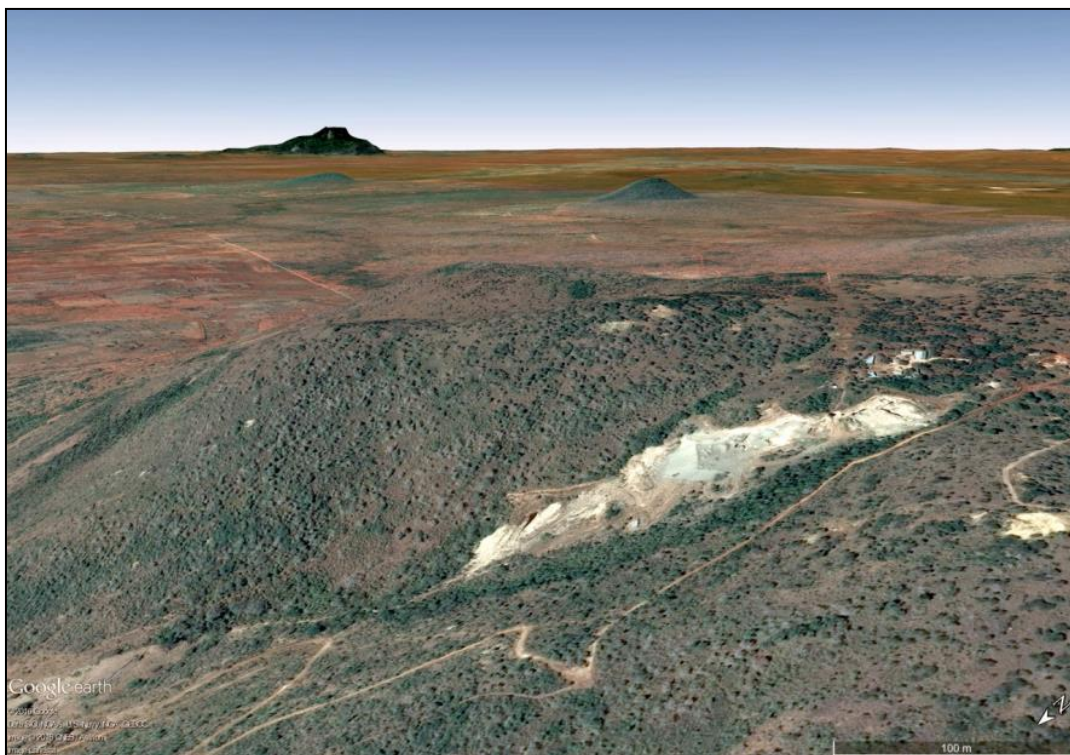


Figure A52: (Top left) Adits providing access to a deeper gallery of interconnected tunnels; (Top right) Dust exposure during dry rock breaking with jackhammers presents a serious health risk; (Bottom left) Living conditions at one of the mine sites; (Bottom right) A diversity of wildlife can be found across the area





A6.4.1. Social and Gender Aspects

As discussed above (see Figure A48), **distinct gender differences are evident with respect to reliance on mining and trade livelihoods**. Specifically, 40% of men and 21% of women participate in mining, whereas, 31% of women and only 9% of men participate in some form of trade.

Men's higher participation rate is only partially attributable to population demographics. Males constitute a slightly greater proportion of the County population (104 M:100 F)¹⁷⁸, with a slightly higher ratio (110:100) observed in communities around mining areas in Mwatate and Voi Subcounties.

Whilst the natural environment, including climate, and land constraints undoubtedly play a role in livelihood opportunities, **a number of other factors also likely work in parallel to influence the reliance on mines**, including those related to socio-economic status, education levels, perception and others. These, as well as socio-economic impacts of benefits of ASM activities are explored further below.

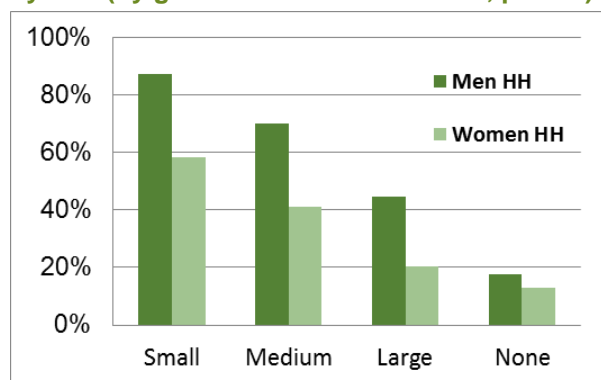
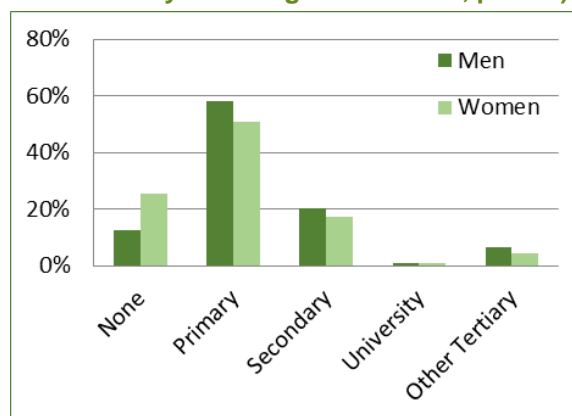
Low economic status, as indicated by ownership of assets, likely plays an additional role in attracting many to work in the mines. However **gender differences in ownership are pronounced, suggesting additional barriers to women's participation exist**.

Specifically:

- 29% more households headed by men own small and medium-sized livestock than women-headed households.
- Of households surveyed, almost 100% of households headed by men own at least one mobile phone whilst only 66% of women headed households do.
- Radios are found in 57% of male-headed households but only 19% of women-headed households, providing some indication of disparate access to information.
- Bicycles can be found in 49% and 19% of households headed by men and women, respectively.

Low education levels can additionally constrain access to different forms of employment, with only 29% and 24%, respectively, of men and women educated beyond primary school level. Remarkably, **approximately 1 in 4 women have no formal education**, disparately disadvantaging them in comparison to men, where approximately 1 in 10 are not formally educated.

¹⁷⁸ Ibid

Figure A53: Household ownership of livestock by size (by gender of household head, p<0.05)**Figure A54: Level of education (% of economically active age individuals, p<0.05)**

Primary school coverage is, however, reasonably high. In 2013, the County had 261 primary schools serving 56,988 of primary school age but only 85 secondary schools, with lack of facilities cited as a key cause for only 33% of primary school children transitioning to secondary school¹⁷⁹. **Only 7% transition to post-secondary education**, despite the presence of one university (Taita Taveta University College), one public institute (the Coast Institute of Technology), one mission Teachers' Training College and four private tertiary colleges¹⁸⁰. Background and origin may also play a role in livelihood opportunities and outcomes experienced by women and other groups.

A substantial proportion of miners are *zururas*, a local term to describe miners or traders holding no legal rights, who travel from site to site illegally working on ranches, privately owned land or within Tsavo National Park¹⁸¹. This group is comprised of **mainly male economic migrants who represent a wide range of ethnic groups from all corners of Kenya**¹⁸².

Indeed, 59% of individuals in surveyed subcounties were born outside of the County and 21% have lived in the area for less than 10 years, and a significant proportion of the mining population are believed to be non-native to the area. The demographic composition of the mining workforce may, in part, resulting from **local taboos concerning the 'satanic' nature of gemstones proliferated by savvy early prospectors and miners** as a means to purchase land at below market prices and keep local residents from engaging in the activity.

Local perceptions and beliefs may also play a role in men's higher participation rates in the sector. Whilst almost all (96%) personally know someone engaged in the sector, views of the sector differ by gender. For instance, men (81%) are more likely than women (66%) to consider working in mining and almost twice as many women as men believe it is a worse job (10% vs. 19%). Perceptions equating women work in ASM areas with work in the sex trade provide an additional social stigma impeding women work in the sector.

Nevertheless, both men and women consider it easy to get engaged in mining (61% and 58%, respectively) and approximately half of respondents (52%) believe that someone employed in a mining activity earns more money than an agriculture worker. Furthermore, for those engaged in mining, most **(69%) women and men did not wish to abandon their jobs in the mines**, providing some indication of the relative benefits derived from this activity. This argument is further strengthened by the fact that many (81%) were working in other sectors prior to their work in mining. For instance, prior to work in the mines, 27% and 35%, respectively, of men and women miners surveyed worked in agriculture whilst 15% and 29% previously worked in trading.

¹⁷⁹ TTCG 2013

¹⁸⁰ Ibid

¹⁸¹ Rop 2014 [P; OBS, assessment]

¹⁸² Mghanga 2011 [P; OBS, baseline]

A6.4.2. Child Labour

Participation of young children in mine work appears to be limited but **youth (between the ages of 15 and 24) is abundant and potentially vulnerable at mine sites**. Few young children were observed at work sites although hundreds of disadvantaged, desperate young men are found working across the area and could have easily commenced work prior to the age of 15 years, thereby constituting child labour. Indeed, 20% of men miners and 14% of women men miners reported not working in other sectors (e.g., farming, trade) prior to work in the mines.

A number of factors may account for low participation of young children observed in the sites visited. The structure of work (e.g., an owner overseeing activities) and abundance of economic migrants seeking work in the mines coupled with the fact that the majority of jobs involve extremely labour intensive underground extraction (rather than mineral processing, as found in the gold sector) may play a role. Although, the median age of households surveyed in Mwatete and Voi is low (37.3 years), only 36% of household members are below 15 years of age, with many households consisting of economic migrants.

Furthermore, **much of the work takes place in remote and largely unpopulated areas**, lending itself to temporary or semi-permanent camps, with many mine workers leaving their families in homesteads and returning periodically. This (combined with low participation rates of women) does not lend itself to the early introduction of children to the mines by helping their parents initially with small tasks. These observations, however, do not preclude child labour that – in other jurisdictions – are commonly found in family owned and operated sites.

A6.4.3. Gender Distribution of Costs and Benefits

As taboos concerning the satanic nature of gemstones have begun to be broken and women's groups such as the Taita Taveta Women's Association are established, **more women have reportedly begun to join the ASM workforce in recent years**. In any event, their participation continues to be low compared to men, constituting, according to the survey performed, only 15.4% of the overall ASM workforce, much of which is in service provision (including cooks, camp maintenance, hauling water), where they constitute 41.9% of workers. Few are engaged at higher levels. For instance, in one large CBO, only 15 of 230 owners are women and only 20 to 25 of 1,500 workers are women. Furthermore, only approximately 1 in 5 mineral traders.

Women are also likely to have less financial resources than men as reflected by disparities in ownership of assets as described above. This may not only reflect constraints in investing in mining (i.e., as an owner/operator) but also to obtain access to sites (e.g., informal costs paid to enter ranches) and secure jobs in crews (which may require payment to managers, supervisors or other team members). Furthermore, for a broad range of ASM mineral commodities, women are more likely to work in mineral processing than extraction, the latter of which avails most jobs in gemstone ASM. Although women work underground in other ASM sites across East Africa, the work is extremely labour intensive, high risk and may be unappealing to many women.

Risks of sexual and physical assault, harassment, intimidation and exploitation, among other forms of **SGBV, may provide an additional deterrent** to women working in mines. Although SGBV was not evaluated in depth during field research, **human rights abuses against women workers** in Taita Taveta have been reported in the media. These main related to assault of approximately 100 women involving body searches for gemstones (including their genitalia) by a mine owner.

Figure A55: Women collecting water from a borehole in a trading centre for sale and household use



Given the nature of working conditions and lack of standards *in general* concerning environmental protection, labour rights and OHS, and as found in other ASM jurisdictions, **additional assessment of SGBV risks is warranted** including alongside much-needed efforts to introduce basic measures, such as pit backfilling, use of PPE, and enforced codes of conduct, to ASM sites in the area.

Finally, many miners reported using funds obtained from mining to invest in other activities (e.g., in land, farming, houses). According to Anyona and Rop (2015), 72% of miners they surveyed were married. As work in the gemstone mines requires long periods away from home, **this situation may enable many families to jointly contribute to household well-being and diversify their holdings**. Indeed, surveys conducted during field assessments in Voi and Mwatete Subcounties indicate that women constitute 58% of the general trading workforce, providing an additional supplement to household incomes.

Unfortunately, this research did not comprehensively assess women's autonomy and capacity to control or make decisions concerning use of incomes. In other ASM areas in East and Central Africa, although **out-migration of male household heads to ASM areas can have many different ramifications for women and girls compared to boys and men** (e.g., related to exploitation, susceptibility to violence), in some cases such situations can create a shift in gender roles, wherein women become *de facto* household heads and out of necessity exercise and develop a greater sense of agency and decision-making power¹⁸³.

For those that are engaged in ASM, the capacity to derive much sought after financial gains seems to be a function of experience and luck. For instance, **one elderly Mzee working for over 30 years in gemstones owns over 100 head of cattle, has built a house and sent 3 children to school, including one at university level**. In sharp contrast, hundreds of desperate, disenfranchised youth (between the ages of 15 and 24) can be found working with only a few years of experience and the clothes on their back to show for their efforts. In this respect, given women's recent entry to the sector, gender driven constraints to mobility and agency (including those related to social stigmas and insecurity) and comparatively low levels of educations puts them at a clear disadvantage.

Gender implications extend well beyond work in the mines to impact on the broader community and other livelihoods. Although most ASM activities are dispersed across largely uninhabited areas, the main trade-off of economic benefits of gemstone sector (section 6.6.3) concerns land access, ownership and related conflicts. For example, **only approximately 35% of land users hold title deeds, with the remainder under communal ownership, resulting in significant sources of conflict** between mining companies and associations holding mineral rights, *zururus* lacking any form of tenure and other smallholder farmers and land users in some cases displaced by activities^{184,185}. In multiple jurisdictions, women are often disparately impacted but such conflicts, mainly due to their reliance on subsistence farming required to fulfil their roles in maintaining household food security.

A6.5. Conclusions from the Taita Taveta Case Study

A6.5.1. Economic Aspects

Tsavorite (a rare green garnet) is the most mined gemstone, generating the highest accumulated value at county level, followed by tourmaline and ruby.

Approximately 10,000 people are involved in gemstone mining and processing. Half of those miners are employed by small-scale companies and paid on a production share. The other half of the workers extract independently.

Trading dynamics of gemstones are complex mainly due to the fact that there's no international daily fixed price or simple way to determine value without some form of training. Valuation of rough gemstones requires special skills, tools, practice and background, cannot be performed as easily, and therefore there is often some **knowledge differential between gem miners and traders**. Further, gemstones buyers are not as common as in gold, where potentially every jeweller can make an offer

¹⁸³ Hinton 2016

¹⁸⁴ Rop 2014 [P; OBS, assessment]

¹⁸⁵ TTCG 2013; Anyona & Rop 2015b

on gold using the touchstone evaluation method, and therefore there is not as many potential sales opportunities. This **market's complexity allows traders to have more commercial power**, especially in an informal market where transactions take place in secret. As a consequence, traders' margins can be as high as 100% of the buying price (but also because of the high risks assumed by the buyer on the final quality).

Miners' net monthly income is presumed to average KES 15,000 (USD 150) per month. Based on the 30% share in the production, the annual local value of extracted gems per miner can be estimated as KES 600,000 (USD 6,000). By assuming that traders generate a 100% markup on the gems, the **national market value of the production from the 10,000 miners in Taita Taveta sums up to USD 120 million**.

Miners' and landowners' share can be assumed as locally spent on food and locally sold consumer goods. Half of investors' share can be assumed as local direct investment. Half of traders' share can also be considered as spent locally. **The local economic contribution can therefore be estimated in roughly USD 80 million**.

Assuming that half of the miners' revenue is spent in VAT-taxed goods, **the gemstone miners of Taita Taveta contribute an estimated USD 1.6 million to the annual Kenyan national budget**. This amount by far exceeds royalty revenues (estimated in USD 96,000 based on the export permits granted in 2015) and confirms the findings of Otto et al. (2006)¹⁸⁶. By optimising the miners' revenues the indirect VAT generated will contribute much more to government revenues than by tightening the control of exports.

A6.5.2. Environmental and Occupational Aspects

The nature and severity of environmental and occupational risks in Taita Taveta's gemstone mines is closely tied to water scarcity. **Most gemstone mining takes place in the arid plains mainly comprised of savannah and bushlands where ground, surface and rainwater resources are limited**.

Among environmental risks, despite cumulatively large volumes of waste generated and surface disturbances of multiple sites, areas are often (although) not always in uninhabited areas. Nevertheless, due to limited water resources, **sensitivity is warranted in terms of ground water quality and quantity**. Some gemstone deposits may introduce deleterious elements (e.g., arsenic, radioactive elements) at risk of contaminating groundwater systems (and to a lesser extent, surface watercourses). In the absence of geochemical testing, such risks cannot be ascertained but, given low rainfalls, are likely to be limited. Impacts on ground water quantity are likely negligible given the scale of operations and reliance on trucked water at most site.

Of greatest concern is the **risk to wildlife**, including elephant, giraffe, zebra, lion and buffalo, that can be found in areas adjacent to Tsavo East and West National Parks. This research did not assess biodiversity risks in significant detail, but poaching and bushmeat hunting has been reported in the area and, particularly in mine camps where miners have been labouring with little to no returns for months, engagement in the practice cannot be precluded. Further assessment is warranted.

Whilst many (not all) environmental risks are reduced by water scarcity, **many occupational risks** are exacerbated by these conditions, particularly those associated with dehydration and sanitation-related diseases. **Chronic dust exposure, particularly during rock breaking, can lead to silicosis and other respiratory diseases** whilst flying rock fragments can readily injure workers or cause loss of eyesight. The exception to this is **reduced risks associated with underground instability and resulting tunnel collapses** with deep water tables. Nevertheless, as most ore-bearing reefs are found within shear zones, influx of ground water may be encountered in some sites.

¹⁸⁶ Otto et al. 2006: 'On the other end of the spectrum, many countries will exempt small-scale or artisanal miners from paying royalties. In general, the cost of administering and collecting royalty payments on these operations is perceived to be higher than the economic benefits. Even in countries where small mining operations are highly regulated, operators may be given a break on royalty payments. For example, many Canadian provinces charge no mining taxes on operations that record a minimum threshold of income during the tax year'.

Insecurity is also a significant occupational risk of work in the gemstone mines. Many miners often travel great distances to camps in largely unpopulated areas often on foot or by bicycle. En route to and from sites and whilst in the camps, **mine workers may be subject to attack and potentially even sexual assault.** This risk is likely most pronounced for women miners and may be one factor limiting their participation, but (as found in other localities) may also pose risks for vulnerable men.

A6.5.3. Social and Gender Aspects

A number of factors jointly influence high levels of reliance on work in the mines including: lack of access to arable land and harsh climatic conditions, constraining crop growing; relatively low education levels, with only 29% and 24%, respectively, of men and women educated beyond primary school level; and generally high poverty levels, as indicated by limited assets (e.g., livestock, mobile phones, bicycles) of households headed by men and, in particular, women.

Indeed, **many residents consider working in ASM to be a better alternative than other options.** Among men- and women- household heads, 81% and 66% consider working in mining to be a better job than other sectors and half of survey respondents (52%) believe that someone employed in a mining activity earns more money than an agriculture worker. Many miners left work in agriculture (28%), trading (17%) and other jobs (36%) to take up work in the sector and less than one third of miners wish to abandon their jobs in the mines to seek other opportunities.

Despite this, **significant gender inequalities in socio-economic status, education and impacts and benefits** are evident. For example, approximately 1 in 4 women have no formal education, disparately disadvantaging them in comparison to men, 1 in 10 of whom are not formally educated. Furthermore, 29% more households headed by men own small and medium-sized livestock than women-headed households, bicycles can be found in 49% and 19% of households headed by men and women, respectively, and radios are found in 57% of households headed by men but only 19% of women-headed households, providing some indication of disparate access to information.

This disparity may contribute to and results from women's work in mines and, in particular, lucrative jobs therein. **Women comprise only 15% of the ASM workforce**, likely as most jobs are in labour intensive extraction and access to work in the mineral trade, as mine owners and shareholding members of CBOs require significant financial capital.

Engagement of young children in mine work appears to be limited but hundreds of vulnerable youth (between the ages of 15 and 24) seem to dominate work at many sites. Much work takes place in remote locations (often fenced within ranches) served by work camps with few families living in immediate area of most sites. Furthermore, women's participation is generally low and most operations (formal and otherwise) are structured around an owner/investor and worker scenario. Few young children were observed at mine sites but this does not preclude their participation, in less formal sites and family owned and operated. However, of the hundreds of disenfranchised, desperate young men found working across the area (many of whom are *zururas*), many could have commenced work prior to the age of 15 years or are currently underage.

A6.6. Recommendations for the ASM Gemstone Sector

Establish a free trade zone market for gemstones. Gemstones are the easiest commodity to smuggle. Their value to volume or weight ratio is one of the highest incentivising their smuggling if fiscal, exchange control or due diligence barriers are in place. In order to formalise its trading and exporting, tax incentives have to be in place. A free trade zone around the sector could amend this distortion.

- Taxation should be removed or set to a low 'carat tax' taxing gemstones on a weight basis independently from their commercial value.
- A business-friendly environment would also allow a competitive cutting industry. Employment should be incentivised, taxation should be low to zero for value-adding processes and investment procedures should be eased for nationals and foreign investors. This will create a reliable sector and attract international buyers and investors.
- The tax exemption should be extended to income taxes and a competitive social security contribution system should be introduced in order to attract investors in the cutting and trading sector.

Establish a strong gemstone cutting industry. In order to add value locally to gemstones, cutting must take place in the country. It is thus a necessity to adopt the latest design trends and cutting techniques. In order to do so, capacity building programmes with international technical support have to be put in place. Incentives to women can also be introduced as cutting can be equally performed by men or women.

Establish a gem centre. Half of the value of gemstones is captured by the traders. If part of this value can be transferred to the extractive subsector or better prices can be obtained, then indirectly, through miners' consumption, tax contributions to the budget will increase. We estimated the current VAT contribution of the Taita Taveta County miners at USD 1.6 million.

- A gem centre where international buyers could buy or where miners or miners' organisations could consult various buyers at the same time would foster competition and finally allow better valuation and balanced distribution of the revenues. This centre could also serve as training centre for cutters and even cutting centre.
- Such centre can only be a success if set as a free zone and coupled with a zero royalty or competitive carat tax. If the centre's activities are taxed, no gemstones will be traded. Stakeholders will prefer staying in the informal markets.
- Further study needs to be performed in order to determine if Voi is the best place to establish the centre or if Nairobi is preferred given its international connections.

Support more effective, equitable, and gender responsive ASM organisations. Miners' associations, CBOs and small companies, which essentially operate as financiers and sometimes owners of operations, need organisational strengthening to improve their performance alongside technical training in mine planning, basic geology, improved underground mining methods and basic environmental and OHS management. Establishment of basic, simple organisational policies, codes of conduct, and rules (environmental, occupational and labour related) with gender mainstreamed throughout could help address a multitude of issues identified herein and would also provide an entry point to begin to address SGBV and other gender issues.

Provide training, to women in particular, on geologic aspects and valuation of gemstones. This would ideally also **include** via leadership and advocacy training and business skills and entrepreneurship development, the latter of which may require support for basic literacy and numeracy. Piloting of establishment of 'mining desks' in local women's trust banks, which currently see loans to miners as a high-risk venture, and establishment of savings groups (e.g., SACCOs) have been shown to effectively support empowerment of women in ASM areas.

Prioritise women's and vulnerable young men miners; participation in formalisation efforts to address inequalities. Aspects related to human and legal rights require specific attention, as well as introduction of processes (e.g., grievance mechanisms) to address land-mineral rights conflicts and exploitation risks for vulnerable groups in the area.

Address research gaps related to SGBV and risks to wildlife and conservation. Tackling SGBV is a sensitive subject and currently being investigated by the Kenyan Human Rights Commission. Results should inform future grassroots strategies in Taita Taveta. Although poaching and bushmeat hunting has been reported across the area, less is known about the specific nexus between ASM, wildlife conservation and protection of biodiversity. A rapid assessment using simple instruments, such as 'Methodological Tools for Assessment of ASM in Sensitive and Protected Ecosystems', would provide much needed insight.