

Artisanal Mining Operation and Its Economic Values, Ethiopia

A Final Draft Report



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Artisan Mining Operation Its Economic Values, EthiopiaA

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LIST OF ACRONYMS

AM	Artisan Mining
BGR	Benishangul-Gumuz Regional State
CSA	Central Statistical Agency
EEITI	Ethiopian Extractive Industry Transparency Initiative
FGD	Focus Group Discussions
GDP	Gross Domestic Product
Kebele	The smallest administrative unit
KII	Key Informant Interviews
MCP	Mining Cooperatives
MG	Mining Group (in Tigray)
MoM	Ministry of Mines of the Federal Democratic Republic of Ethiopia
NBE	National Bank of Ethiopia
CBE	Commercial Bank of Ethiopia
SME	Small and Micro Mining Enterprises
SNNPR	Southern Nations, Nationalities and Peoples Region
Woreda	Equivalent to District

EXECUTIVE SUMMARY

A situational analysis on artisan mining was conducted in five Regional States of Ethiopia, namely Oromia, Tigray, SNNP, Benishangul-Gumuz (BGR) and Amhara as part of the EEITI process. The general objective of the study is to analyze various aspects of artisan mining operations in Ethiopia, its economic value, social contribution and social impacts. In addition, the assessment includes as to what process could be undertaken to integrate artisan mining information into EITI reports and EITI processes.

A value chain framework was employed to collect and analyse Quantitative and Qualitative data. Key informant interviews, focused group discussions and direct observations of mining areas were extensively carried out during the data collection process. Discussions were also made with experts and officials of stakeholders in all relevant institutions. Secondary data were collected to complement the information for key institutions and stakeholders. Gold and gemstone are the focus of the study in the selected major artisan mining woredas (districts) of the country.

Key findings

1. Contribution of AM to the National Economy

- Ethiopia has a huge potential of various mineral resources, but not yet well explored and exploited, and hence its contribution to the overall economy or GDP is low. However, as reported by the World Bank Group (2014), its contribution to the foreign exchange earnings reached about 10% of which the artisan mining takes the lion's share of over 65%. The artisan mining also significantly contributes to the employment of at least 1.26 million people and supports the livelihood of over 7.5 million populations.
- According to the results of this study, at regional level, SNNPR collected royalties close to 13 million birr and Oromia about 8 million birr whereas, the remaining regions were much weaker in collecting royalties. Nevertheless, rough estimation, based on secondary data and key informant interviews with experts/officials of concerned institutions, shows that only 36% of potential royalty was collected in 2014 and it is a huge loss to the government. Particularly, Oromia loses revenue of about 28 million birr every year due to failure of collection of royalties.

2. Demographic characteristics

- The majority of the artisan miners are between the ages of 18 and 45 years; economically, they are very active and moreover they are at the peak of the productive/reproductive

age. In all the locations considered in the study, the majority of the artisan miners are males (estimated at 65%). Women participation is significant in BGR (70%) and Oromia (30%), and low in SNNPR, Amhara and Tigray (< 20%).

- The information obtained from the community reflects that the participation of women in artisan mining is quickly diminishing, due to the increasing scarcity of placer minerals, remoteness of the mining locations from residential areas, harsh climate, and the inherent tiring and risky working condition of mining. For similar reason, the participation of children and the elderly is negligible except that it is estimated to be 5% in BGR, 6% in SNNPR, 9% in Tigray and 10% in Oromia (SUDCA, 2013).

3. Migration and conflicts

- Rough estimations made by the local government offices show that the migrants account for as high as 70% in Bero woreda of the SNNPR and about 50% in Shakiso of Oromia. However, this figure drops to 20% to 30% in Tigray and in Amhara, and only 4.5% in Benshangul Gumuz. While the migrants from the other regional states account for 25% to 30% in Oromia and SNNPR, the migrants to the mining communities of Tigray, Amhara and BGR are majorly from the neighbouring woredas.
- There is no strong evidence on incidences of conflicts among the artisan mining communities except rare cases of theft and cross-boundary movements. However, the conflict between the artisan miners and private companies seems serious. It has happened due to overlapping of mining areas, resulting from poor licensing and area delineation problems.

4. Livelihood of the mining communities

- For the majority of the artisan miners (legal or illegal), mining is the backbone of their livelihood. It is the major source of income in the study regions. On the average, artisan mining accounts for 74% of the livelihood of the miners as estimated by the KII and FGD participants. Specifically, it contributes to 45% of the livelihood of the mining communities in Oromia, 57% in BGR, 60% in SNNPR and about 84% in Tigray and Amhara.

5. Access to Basic Infrastructure

- Though access to physical infrastructure is generally improving in the country as a whole, the AM communities in the surveyed areas seemed still disadvantaged, compared to other non-mining areas, particularly in the highland farming communities. They lack communal facilities, such as water supply, health care, road infrastructure, etc., and the total coverage is much lower than the national averages. Access to roads is extremely limited, and in some mining areas, it is extremely difficult to transport mining products from the mining sites to nearby towns. This has significantly hampered improvement of their welfare services.

6. Legitimacy and Licensing

- The government has enacted legal issues through series of proclamations to address the mineral operations in the country, including artisan mining and transaction of precious minerals, though implementation of the legal enforcement at grass-roots level is weak. The current system has a serious deficiency as both licensed and unlicensed artisan miners practice in a traditional manner with no limit in time and boundary, i.e., the vast majority of miners and mineral traders are operating informally.
- Interestingly, the new regulations (816/2013) limit the relevance of miners' cooperative as an entity and the period of validity of artisan mining licenses from a possible nine years (with renewals) to a maximum of two years. Although this may seem counter-intuitive, given the financial success of the current regulations, it is based on certain social considerations. By reducing the period of validity of artisan mining licenses, the government hopes to encourage Ethiopians to view artisan mining as an economic stepping stone to a more profitable business, rather than an end in itself, enabling them to generate and save money (seed money). However, it may always remain a difficult and risky occupation with no guarantee of quick returns.

7. Artisan Mining Operation

- Artisan miners extract the minerals from the earth which vary by type and source of deposits. The AM mined the minerals from both surface and underground (sub-surface). Women tend to mine more on open surface and on shallow depth, while men tend to mine more deep holes and underground tunnel (as deep as 15 to 25 meters), especially for gold and gemstones. Today, surface mining seems exhausted everywhere in the country, and hence extracting rocks deep in the earth becomes increasingly important. Nearly all miners use hand/manual tools to do both mining and processing of Gold and Gemstone.

8. Gold Production and Labour Income

- The total population involved in gold mining (legal and illegal) is estimated at 1.24 million. Taking into account the number of artisan miners and average annual production, rough estimation (as indicated in section 6.3) shows that, in the major gold producing areas of the country, a total of about 18,000 kg of gold is produced per annum. The largest production is recorded in Oromia, followed by SNNPR. Yet, an extensive study is required to validate the estimated gold production by the artisan miners.
- The overall labour income to an individual miner is roughly estimated to be 8,000 to 10,000 birr per annum, with a high standard deviation over the year, and considerably vary from mineral to mineral and location to location. However, mining households consume much of the money they earned on food and drinks, and other expenses in the mining area. As a result,

they save little (not more than 5%) to invest in other activities to improve their livelihood in the future.

9. Marketing

- Based on the results of the study, the volume of mineral marketed, particularly gold, through formal (legal) channel is estimated at only 39% of the total production. The minerals that are collected by legal buyers at production site (from both legal and informal producers) is directly channelled to the National Bank of Ethiopia for export. However, the remaining balance (61%) goes through informal channel that is largely absorbed in the local or central markets, and some possibly exported through sales to tourists and foreign passengers.

10. Environmental Impact of AM

- Nearly all miners have little knowledge on the harmful effect of mining which causes land degradation and the need for rehabilitation as a result. The major harm to the environment entails deforestation (excessive tree felling), soil erosion and land degradation. In general, rehabilitation or restoration measures are not in place by miners to ameliorate the environmental impacts caused by mining.

11. Problems and challenges

- Key problems and challenges have been identified. These include: massive informal mining practices, poor awareness and understanding of the mining proclamation, lack of proper guiding rules, weak institutional capacity to provide and adequate support services, rudimentary mining practices and lack of skill and technology, unreliable market prices (particularly for tantalum and opal), worsening problem of water shortages for processing and absence of or poor road conditions.

12. Recommendations

- Recommendations are systematically organized to mitigate the harmful impact of the above problems and challenges. It ranges from a call for political commitment to give attention to the sector in terms of budget and human resources to enhancing legal enforcement, render adequate public support services, and enable access to modest technologies and basic infrastructure (particularly water and road).
- While these recommendations should be taken as important prerequisites to improve the situation of artisan mining, a systematic and stepwise approach is also suggested on how to generate basic information and establish database for the EEITI process.

I. INTRODUCTION

According to the African Union's Africa Mining Vision of 2009, the number of Africans directly employed in artisan and small-scale mining varies between 3.7 and 8 million, implying about 10% to 30% of the population are reliant on the sector. The ASM accounts for 18% of the continent's gold production. In addition, with the exception of diamond, almost all of the continent's gemstone production comes from the ASM. Yet the widespread failure to bring these operations into the formal sector has consequences beyond the obvious loss in tax revenue from illegal workers and exports (Economic Intelligence Unit, 2009, (<http://aigaforum.com/articles/economic-unit-on-mining>)). Artisan Mining in Ethiopia has been the basic mineral and rocks production and processing sector throughout the older civilianization of the country. It is a non-mechanized mining operation by non-professionals (mainly manual labour in nature) of gold, gemstones, tantalite, salt, clay, industrial and construction minerals/ rocks and others. Nowadays, Artisan Mining is taken as a primary source of employment for job seekers from various parts of the country who are relatively disadvantaged in the labour market (e.g. unskilled, low-skilled, women, disabled, etc.). Thus, the number of people entering into this sector seems significantly increasing. Some government reports estimated that over five million are directly or indirectly beneficiaries of this mining sector. The artisan mining is also assumed to be an important source of income in increasing the wealth of rural population, in addition to providing opportunities for alternative livelihoods and contributing to poverty reduction and export earnings.

However, business is operating under uncertain environment; that is, operators lack basic infrastructure, inadequate technical supports and often confront with unfair market prices. People are working in unhealthy and unsafe working environment, commonly using outdated mining technologies.

Nowadays the government is taking steps to improve the situation by creating environment conducive to traditional artisans as well as to medium and large-scale private investors. The Ministry of Mines, in collaboration with development partners, is working towards formalizing and assisting Artisan Miners, such as legalizing through licensing, providing materials and training to build their technical capacity, laying down basic infrastructure and technological supports, facilitating and strengthening the legal market system, etc. This will help improve the well-being of artisans and increase the exports of high value minerals and earning of foreign currency.

The EITI allows the inclusion of many aspects of information about artisan mining in the process. For example, the Central African Republic has sought to adopt the EITI model for its predominantly artisan mining economy by focusing its efforts at reporting and data gathering at the export level (i.e. the buyers and exporters). For countries like Ethiopia, which have a significant artisan mining sector, artisan mining activity is one category of information that needs to be integrated into EEITI reports.

Nevertheless, basic information on artisans and their activities is missing. For instance, information is scant about licensing criteria, potential of the resources in their operation areas and their economic and employment contributions, payments and receipts, modality of cooperatives, etc. For this purpose, the Ministry has received grant from the World Bank to support the Extractive Industries Transparency Initiative and to use part of the proceeds for consulting services in preparing a Scoping Document on Artisan Mining Operation and its Economic Values.

2. OBJECTIVES AND PURPOSE OF THE ASSIGNMENT

The general objective is to analyze various aspects of artisan mining operations in Ethiopia, its economic value, social contribution and social impacts. In addition, the assessment includes as to what process could be undertaken to integrate artisan mining information into EITI reports and EITI process.

The following are major issues investigated:

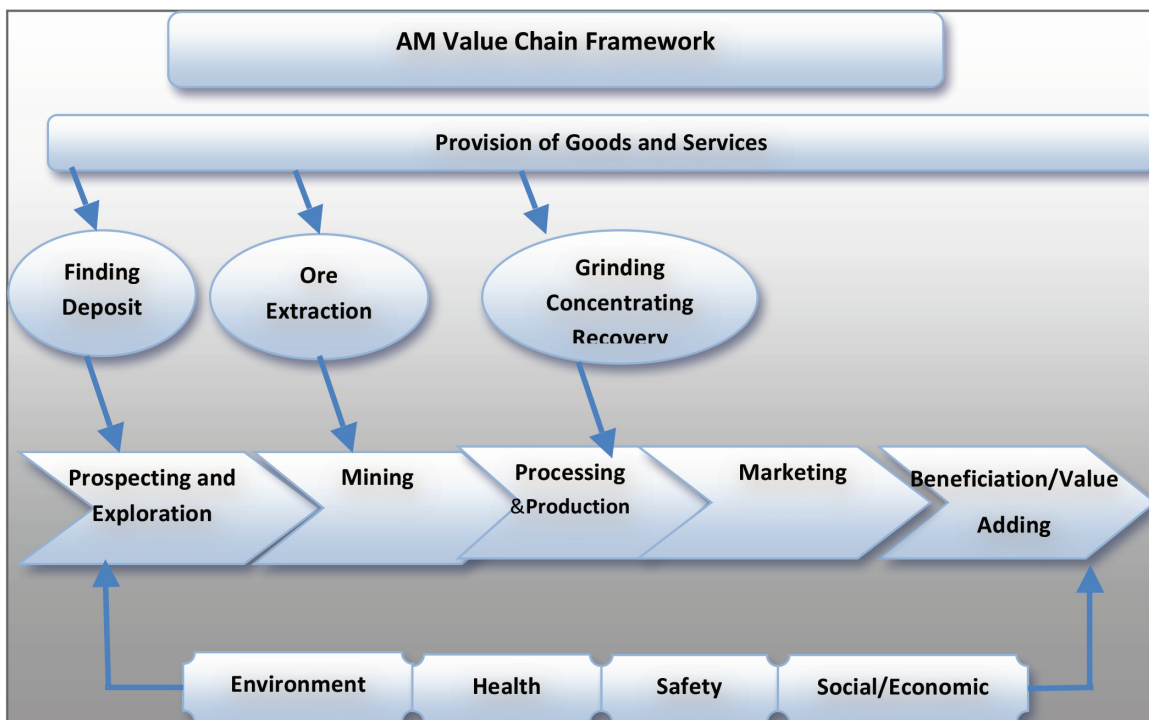
1. Requirement/Eligibility for Artisan mining license and total miners as a group in different sites registered in the country;
2. The potential of the resources surveyed, extraction system and handling system of extracted resource by the miners;
3. Direct contribution of artisan mining to the economy at national, regional and woreda levels;
4. Production and employment statistics- disaggregated by commodity, mine site and/or region, and aggregated at the national level, if possible;
5. Formal revenue streams derived from licensing permits, leases paid, etc.
6. Ways and level of cooperatives or associations organized to mine the resource;
7. Reporting payments made to the artisan mining sector to procure artisan-mined commodities;
8. Guidance on what types of data may be relevant to artisan mining and how Ethiopia, as an EEITI country, could go about collecting and consolidating that data; and
9. Identification of systematic approach towards artisan mining data integration into EEITI processes and EEITI reports;

3. STUDY APPROACH

3.1. Conceptual Framework of the Study

Based on the terms of reference, and in accordance with the internationally recommended approach, the study was conceptualized within the 'ASM value chain'. As illustrated in the following framework, all the stages of the mining chain, i.e. production, processing and sale activities were assessed.

Figure 1: Conceptual Framework of the Study



Source: Adapted from Adriana E. et al (2012), World Bank

Therefore, detailed investigation and collection of necessary information from a variety of participants, along the value chain, was conducted to characterize the production, processing and marketing of minerals being mined by ASM. Moreover, the role of men, women and children in the mining process was a topic for analysis to understand ASM value chain.

In the case of artisan mining, the existence of and access to natural capital in the form of mineral deposits has a central role, determining even the target area of profiling. The source of livelihood and available human capital, followed by financial capital, are the next issues for discussion as income generation is one of the main “driving forces” of the ASM. The sequence of discussing physical capital, which comprises mining technology, as the “last” asset, does not reflect low priority ranking (as the underlying idea of the livelihood-pentagon is that every corner is equally important) but the fact that in the final analysis the key to increasing income is productivity, and the key to productivity is technology (Richard N., Marieke H., Felix H., Bernd D. 2004).

3.2 Methods of Data Collection

Both qualitative and quantitative data were collected. Review of Secondary Data and Primary Qualitative Inquiries were made to produce comprehensive information on Artisan Mining (AM) and affiliated institutions. First, a set of indicators was developed to make sure that all topics and matters in the indicators are included in the data collection instruments. Secondly, (a) Discussion Guide, in the form of checklist for key informant interview (KII), and Focused Group Discussions (FGD), and (b) template for secondary data collection were prepared for the concerned Regional Bureaus and woreda offices.

a. Secondary Information

Preliminary information was collected from local and international documents to deepen our methodological approach and analysis. This include, among others, study report and research outputs undertaken by federal and regional relevant offices and non-governmental actors in the sector; outputs of researches undertaken in the same area in other developing countries. Attempts were made to collect secondary data, such as the magnitude of AM participants, demographic characteristics, income generated, revenues, etc. In addition, proclamations were briefly reviewed. To this end, we reviewed international experiences for surveys on artisan and small-scale miners in Africa, Asia and Latin American countries with similar socioeconomic settings. Secondary information helped the consultant to understand the ASM sector and to develop indicators and design all-inclusive data collection instruments. In addition, the secondary information helped the consultant to substantiate the findings of the primary data.

Table 1: Institutions contacted for the secondary data collection and key informant interview

No.	Name of Institutions	No.	Name of Institutions
	<ul style="list-style-type: none"> Ministry of Mines 		National Bank of Ethiopia, Revenue and Customs Authority
	<ul style="list-style-type: none"> Ministry of Trade 		<ul style="list-style-type: none"> ASM Cooperatives and others,
	<ul style="list-style-type: none"> Revenues and Audits 		<ul style="list-style-type: none"> Non-governmental development actors working in the same area
	<ul style="list-style-type: none"> Regional Mining Agencies 		<ul style="list-style-type: none"> Cooperative Agencies,
	Environmental Bureaus at regional levels,		<ul style="list-style-type: none"> Concerned woreda's Security offices

b. Primary data collection

For this study, five regions have been selected for their higher relative importance in AM. These include Tigray, Amhara, Oromia, SNNPR and BGR states. Information was directly collected from individuals, groups/cooperatives directly engaged in artisan mining operations at any point in the Mining Value Chain, particularly in (i) Prospecting/ Exploration, (ii) Mining/Ore Extraction, (iii) Processing, and (iv) Marketing. To generate a wide array of information that complements the secondary information, quantitative and qualitative data were collected through FGD and KII.

- i) Consultation with Key informants:** A team of consultants undertook consultations with government officials and experts at federal, regional, zonal and woreda levels of the line ministries, agencies and authorities mentioned above.
- ii) FGD with Miners and communities:** Group interviews were conducted with artisan miners, using a semi-structured checklist in addition to open discussions. The discussion included, among other things, operation process of mining, views, perceptions and philosophies of the members of the AM communities, and problems of working in the mines and their desires and future aspirations. The Qualitative Inquiry was done, whenever possible, with separate groups of men and women in each mining site of selected major mining woredas.

In each region, two or three major artisan producing woredas were visited. Furthermore, at least three kebeles (mining sites) in each sample woreda were visited for FGD and observation of mining operations. In general, about 38 FGDs, with estimated total participants of 570 miners, were involved in data collection.

- iii) Direct observation of ASM Sites:** The AM site visits were particularly important to get full picture of the socio-economic condition of the AM, mining process, marketing, environmental and risk aspects, challenges and opportunities.



Details of the locations considered for this study are indicated in Table (2).

c) Minerals considered in the AM study

From review of literature it was learned that the Ethiopian artisan miners are engaged in the mining of (i) high value minerals such as gold, gemstones, tantalite, and (ii) quarrying for industrial and construction minerals/ rocks (salts, dimension stones, ignimbrite, sandstone, limestone, gypsum, clay). Most importantly, the artisan miners are involved in the mining operation of placer gold deposits and gemstone (opal). Thus, this study considered situation analysis of artisan mining on gold and opal only.

Table 2: Regions and sample woredas visited for data collection AM

Regional States	Mineral Considered	Woreda
1. Tigray	Gold	1. Aseged Tsembela
		2. Laelay Adeyabo
		3. Mereb
2. Amhara	Opal	4. Wadela
		5. Delanta
3. Oromia	Gold	6. Melkasoda
		7. Seba-Boru
		8. Odo-Shakiso
4. SNNP	Gold	9. Bero
		10. Haroresa
5. Benshangul Gumuz (BGR)	Gold	11. Sherqole
		12. Mengae
		13. Kumruk

3.3 Scope and Limitation of the Study

While artisan mining is practiced in almost all regional states, this study covered only five major production regions as mentioned above. Moreover, the study was mainly concentrated on two most important precious minerals, i.e. gold and opal. Yet, the coverage is extensive enough to represent the national picture.

The collection of quantitative data was a critical challenge during the fieldwork, emanating from lack of data records, and partly due to sensitivity of the information as implied by accountability for royalties. For instance, quantitative records on volume of mineral produced and income earned by the artisan cooperatives, SME and Development groups could not be easily available, though they are legal entities operating as artisan miners. They were hesitant to genuinely declare their actual production/income just to avoid any proportionate payments of royalties. Thus, amount of production and income of the legalized entities, like the cooperatives, SME and organized development groups could not be directly included in this study and, hence, the only option was to make an indirect estimation, based on per capita production/income per year. Interestingly, the information was systematically collected from individuals (particularly the informal miners) as well as from key informants and local collectors (buyers) of the minerals. Since the informal group of the artisan miners constitutes the majority (about 94% of the total miners), the information would be reliable in portraying a good picture of the artisan community.

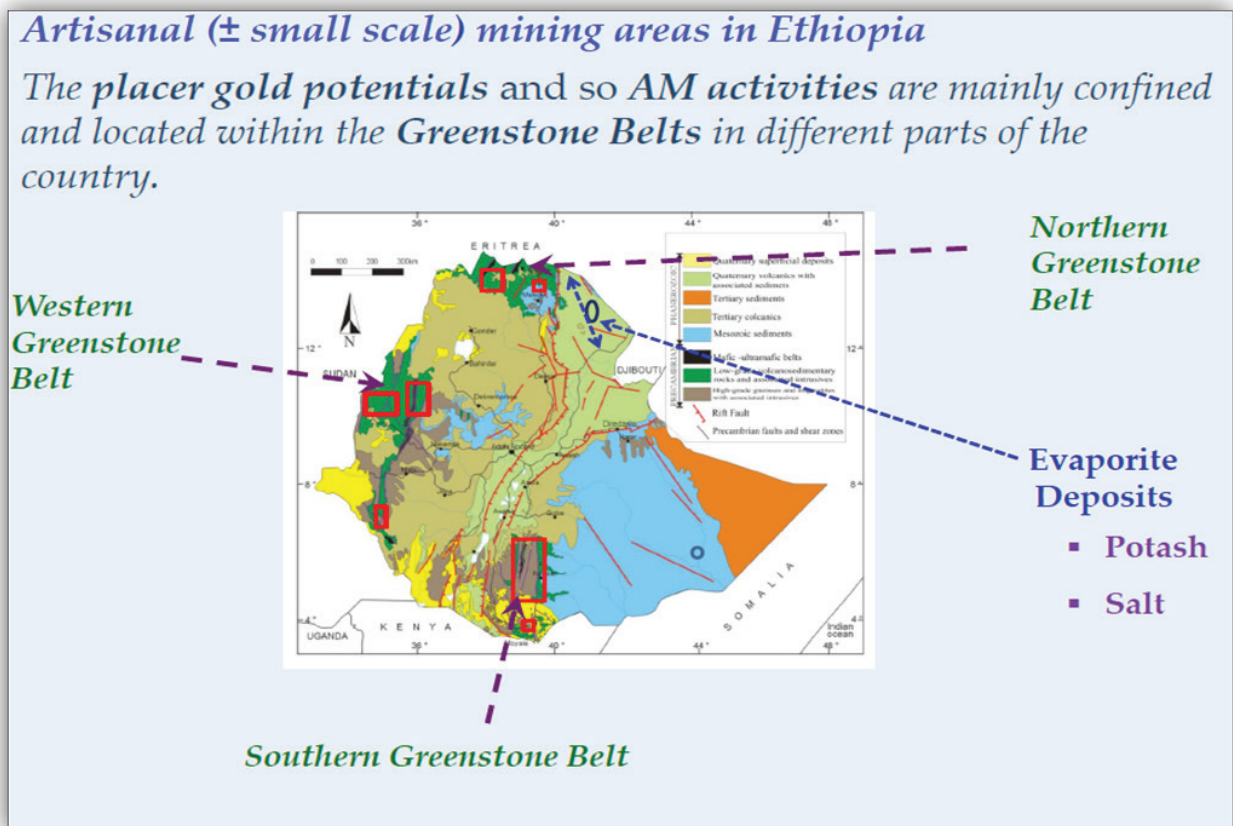
To ensure the creditability of the information, quantitative estimation was made based on secondary data collected from zonal and woreda offices of the affiliated institutors, and complemented with the results of interviews with mining practitioners and key informants as well as direct site observations. The secondary data from the offices were triangulated with the primary data collected through the interviews and checked for consistency. Thus, while the information in this document can be considered as a breakthrough for planning and strategic intervention, a more detailed quantitative study is suggested for an in-depth analysis and refinement of key parameters.

4. OVERVIEW OF THE NATIONAL CONTEXT OF MINING IN ETHIOPIA

4.1 The Mineral Resources and Mining Structure

Ethiopia is a nation endowed with various mineral resources. According to the Ethiopian Geological Survey of the erstwhile Ministry of Mines and Energy (MoM, 2012), the resources discovered in different regions of the country are mainly gold, tantalum, phosphorus, iron, salt, potash, soda ash, gemstones, coal, geothermal and natural gas. Other mineral resources are platinum, niobium, copper, nickel, manganese and molybdenum. Ethiopia is also endowed with a range of industrial mineral deposits, including potash, limestone, coal, iron ore, tantalite, field spar, quartz, dimension stones and dolomite, among others. Marble is found extensively in most parts of the country. However, it has not yet been well explored and exploited to the maximum benefit of its inhabitants. Figure 2 shows the high potential deposit areas for small-scale and artisan mining, and the activities are mostly concentrated in the greenstone belts located in the tip north, west and south part of Ethiopia, close to the borders of the neighbouring countries.

Figure 2: Map of the Mining Locations



Structurally, state owned corporations, private companies, artisan, and small-scale miners (ASM), mine the minerals.

- The state-owned companies are producing cement, dolomite, feldspar, kaolin, niobium, quartz and tantalum. The Ethiopian Minerals Development S.C. (EMDSC), a state-owned company that mines tantalum, concentrates in the Kenticha mine in Oromia Regional State in Guji zone. Kenticha mines have resources to the extent of 9,000 tones of processed potash, which could be extracted for the next 15 years. This mine also produces industrial minerals such as quartz, feldspar, kaolin and dolomite. The tantalum deposit of Ethiopia is located in the eastern side of the Adola gold field. There is also a small state-owned mining site called Adola, where alluvial gold has been mined for over half a century.
- The private companies are producing Cement, Gold, Marble, Platinum and Silica sand. The strongest and the largest private large-scale mining is MIDROC Gold Mining in southern Oromia. The company started mining in 1998 and annually produces four tons of gold in the Lega Dembi mine in the Oromia Regional State. The amount of gold produced by these mines is reported to be about 5 tons per year.
- The artisan and small-scale miners are producing clay, crushed stone, diatomite, gemstones, opal, gold, gypsum, salt, sand, silica sand, and tantalum. Gold has been exploited since ancient times. Placer gold has been mined in Ethiopia for more than 2000 years, but a significant large-scale mining sector has not been developed yet. More than one million people are engaged in artisan mining, primarily focused on gold. Gemstones, mainly, opal, are produced by artisan miners (MME, 2010). Tantalum is also produced by artisan miners.

4.2 Legal Framework of the Mining

The legal and fiscal environment instituted by the government permits a free market driven economy, allowing both foreign and local companies to participate in the mining development of the country. Ethiopia opened its mining sector to private investors in mid-1991 because of the political change in the country.

Mining in Ethiopia is governed by an independent legal regime. From the last two decades, several proclamations were issued (some with amendments) driven by the growing demand for metallic and industrial minerals and the need to create highly competitive legal frameworks for mining investment in Ethiopia. The country's mining proclamations constitute the following particular proclamations:

- *Mining Operations Proclamation No. 678/2010; amended under Operations Proclamation No. 816/2013*
- *Transaction of Precious Minerals Proclamation No. 651/ 2009*
- *Mining Operations Regulations No. 182/ 1994; amended under Regulations No. 27/1998*
- *Mining Income Tax Proclamation No. 53/ 1993; amended under Proclamation No. 23/1996*

The Mining Operations Proclamation governs all mining and related activities in the country. It underlines that mineral resources of the country are the property of the State and the People. The Government, custodian of mineral resources, acts through the licensing authority to control and administer mineral resources. Mining activities are open for private investment and the mining law provides legal safeguards for tenure security. The stakeholders which participated in the drafting of the Ethiopian mining regulation include the Ministry of Mines, Geological Survey of Ethiopia, Environmental Protection Authority and regional mining agencies. According to the Proclamation (No. 816/2013), the Licensing Authority can issue four types of mining licenses (see Table 3).

Table 3: Types of Relevant Licenses in Mineral Mining (Proclamation No. 816/2013)

Types of Mineral License	Duration	Remark
1. Artisan Mining	up to 2 years initial – Non renewable	Exclusive; Reserved for nationals; Regional States provide license
2. Special small-scale mining	Up to 10 years + renewable for 5 years	Exclusive
3. Small-scale mining	Up to 10 years initial + renewed for 5 yrs unlimitedly	Exclusive
4. Large-scale mining	up to 20 yrs initial + unlimited renewals of 10 years each	MoM Provides a large scale exclusive mining license

Source: Mining Operation Proclamation No.678/2010 and 816/2013)

Note: Other types of Licenses include Reconnaissance, Exploration and Retention

4.3 Requirement/ Eligibility for Artisan Mining License

Resource required - In Ethiopia, the cost or qualification required to gain an artisan mining license is not prohibitive. Proclamations No. 678/2010 and 816/2013 specify that no financial resources or technical or professional competence is required to acquire an artisan mining license.

Location of licensing: Artisan mining licenses can be obtained from the regional state governments (at zonal or woreda level). This reduces ups and downs of unnecessary bureaucratic procedures and opens up the sector to those who cannot afford to travel to regional bureaus or to the federal ministry in Addis Ababa.

Right: Artisan mining license provides an exclusive right to explore and mine for the minerals within the license area.

Security: Artisan miners who gain a license are offered a large degree of security. Although small- and large-scale licenses take precedence over artisan licenses, the licensing authority is obliged to give 90 days' notice and the option of an alternative mining area when revoking initial mining sites. Artisan miners are also given a guaranteed market; all artisan mined gold is purchased by the National Bank of Ethiopia (the central bank), at a market-based value through official purchasing centres (Commercial Banks) located in all major artisan mining areas. This is important to reduce marketing cost and mitigate smuggling.

Obligations: A licensee shall be obliged to undertake mining operations according to the environmental, health and safety standards, prescribed for artisan mining in the relevant laws. License fees are set by the state, but are invariably low, and artisan mining is exempted from taxes. As per the proclamation, the only universal payment that the artisan miners should make is the mineral royalty (e.g. the payment can be variable across the region ranging from zero to 8% maximum such as for gold). Every licensed groups or cooperatives engaged in artisan mining are supposed to pay the royalty to the local (woreda) Revenue and Customs Authority at the end of the budget year.

Validity: This type of license is valid for the period of up to two years and shall not be renewed.

Transaction: The proclamation also states types and requirements for transaction licenses to facilitate marketing of mineral products, specially mined by artisans. The transaction licenses include: (i) Precious minerals brokerage license; (ii) Precious minerals crafting license; and (iii) Precious minerals refining license. According to the proclamation, any person who has been issued a license, in accordance with the appropriate mining laws, is not required to have a Certificate of Competence (special skill) in order to sell locally or to export abroad the precious minerals he/she produces. Moreover, the proclamation restricts illegal involvement in mineral transaction, stated as "no person shall carry out the transaction of precious minerals unless he/she is registered in the appropriate government office and is a holder of an appropriate and valid license or Certificate of Competence as appropriate". /Article 4/

Box 1: Analysis of the Proclamation 688/2010 and the Amended Proclamation No. 816/2013 shows that:

- Miners have been massively organized into cooperatives as per the earlier proclamations, but the amended Proclamation 816/2013 has deleted the relevance of the mining cooperative. This means the future of the already established cooperatives is not clear. Interviews with the officials reflect that the cooperatives can be transformed into small-scale mining entities if they can qualify (some already did so), or should move to other alternative business. However, it remains questionable whether or not other rewarding business opportunities are there for such cooperatives in the locality.
- The proclamation does not encourage use of modern technology to be used in artisan mining. This may induce inefficiency (low labour productivity) and wastage in the mineral resources, and aggravate land degradation. The problem could be more severe as resources increasingly become scarce (e.g. placers are depleted) and where use of technology (such as detectors and simple digging machines) becomes imperative.
- No employee – means only physically able people can engage – alienating the elderly and disabled
- No technical and professional competence is required - Ignored the relevance of indigenous knowledge (where no support in training is offered as such).
- The proclamation directly targets provision of job opportunity to the youth (to collect seed money for some time and engage in other businesses) with a continuous replacement of one batch by another every two years. It seems good from the point of view of fair distribution of the benefits. However, the tradition of artisan mining, as a supplementary livelihood for agriculture and the fact it is operated as a traditional practice through indigenous knowledge, will be eroded.
- The fact that the license period is limited to a maximum of two years and operation is manual (maybe with no indigenous knowledge), the chance of generating sizable income at the end of the license period is unlikely for the majority of artisans. The probability of becoming a transformed either to *special small-scale mining* or shift to other alternative business could be dubious. Moreover, if they have to abandon from the area immediately after two years, so they should not have sense of ownership to take care for the environment. These are the situations exactly observed on the ground during the field survey.

5. CHARACTERISTICS OF THE MINING COMMUNITY

5.1 Legitimacy in the Artisan Mining Process

Legal artisan miners are those organized as a formal Mining Development Group (composed of three or more persons) (MG) or as a Mining Cooperative (MCP). The Mining Operation Proclamations No. 678/2010 and the preceding proclamations underlined that miners should necessarily be organized as cooperatives. On the other hand, the amended Proclamation No 816/2013 totally deletes the relevance of Cooperatives in mining; instead, it encourages Special Small-Scale or Small-Scale Mining. This has created confusion with the concerned stakeholders as to what to do with the already established cooperatives and how to organize the newly coming miners. Now, the consensus is that artisan cooperatives should be dissolved once their license expires; to be transformed either into Small-Scale Mining or totally be shifted from the mining activity to any other business.

Immediately after two years of operation, the MG can be transformed into **“special small-scale mining”** if it successfully meets the criteria (adequate financial resource, use of modern technologies, etc.), or it would totally abandon the mining sector and shift to other business as per Proclamation No 816/2013.

During the field visit, it was observed that in Tigray only MG is a legal entity and as a result MCP and Small-Scale Mining were not established. In all the other regions, however, legal mining operators are only those organized as MCP and Small and Micro Enterprises (SME)¹, in accordance to Proclamation No. 678/2010 and the preceding one. Tigray Regional State was so late to organize the miners in accordance to the amended Proclamation 816/2013 (See Table 6).

However, it is difficult to notice a legitimate artisan mining

Not surprisingly, based on the field survey, the proportion of formally organized (licensed) artisan miners is only about 6%, i.e. about 94% of the total miners are unlicensed, and hence are informally operating. The latter operates its mining activities anywhere the resource is available (not confined to a specific area) even crossing boundaries of kebeles or even woredas. This shows that illegal miners have a better opportunity of accessing resources than the legally entitled miners who are restricted to one location only. There is no government attempt to control this informal practice in any of the regions visited. The situation has prompted the legal miners to follow the illegal practices to mine anywhere accessible to them. Nowadays artisan mining is dominated by unlicensed miners and licensing has become only a nominal desk work.

¹ Licensing of small and micro enterprise (SME) is not in the Proclamation, but it seems to represent the small-scale mining.

operation. During the field visit, we observed that mining is operated by licensed groups and cooperatives and by unlicensed (also called informal) individuals. In principle, the licensed groups or cooperatives are legally provided with a certain specified area of land to mine (the size varies from as low as 1500 m² to 5000m² in Tigray, more than 5 -10 ha in Oromia and to as large as one kebele in BGR). Mining operation by a group or cooperative anywhere outside the delineated area is regarded as illegal.

5.2 Demographic Characteristics

The majority of the artisan miners (legal or illegal) are between the ages of 18 and 45. They belong to the very active economic class and, moreover, they are at the pick of the productive/reproductive age. In all the locations considered for the study, the majority of the artisan miners are males (65%) as compared to female (35%). Nevertheless, women participation is exceptionally significant in BGR (70%), Oromia (30%), and low in SNNPR, Amhara and Tigray (less than 20%). Women's engagement in the business of mining is declining because placer gold is increasingly depleting and less accessible and miners are aggressively moving to rock mining (like digging/ tunneling too deep in the earth). In addition, miners have to travel long distances from residential areas facing harsh climate, tiresome and risky operation. The problem is more serious in Amhara for opal mining and in Tigray for gold mining communities. Similarly, SUDCA (2013) estimated that the participation of elders (> 60 years) and children is diminishing, estimated at 5% in BGR, 6% in SNNPR and 9% in Tigray and 10% in Oromia. The available information reveals that the role of women and children in artisan mining is gradually declining and is forecasted to be further diminishing due to the fast dwindling trend of the mineral deposits.

5.3 Livelihood of the Artisan Miners

For the majority of the artisan miners (legal or illegal), mining is the backbone of their livelihood. It is the major source of income in the study regions. On the average, artisan mining accounts for 74% of the livelihood of the miners as estimated by the KII and FGD participants (Figure 3). Specifically, it contributes to 45% of the livelihood of in Oromia, 57% in BGR, 60% in SNNPR and about 84% in Tigray and Amhara.

Agricultural activities and petty trade are the second and third source of income for mining households, but they only contribute 9% and 8% of the household income respectively. Still, at the national level, about 42% of the miners have no other means of livelihood except mining, and this figure is estimated to be as high as 50% to 60% in Tigray and Amhara (i.e. they are entirely dependent on artisan mining). Mining is also practiced to supplement the seasonal farming and livestock husbandry, where land is relatively available. The total landholding for the AM practitioners ranges from zero to 2.5 ha. The average landholding of the miners was found to be highest in BGR (2.5 ha), followed by Oromia (1.5 ha) and SNNPR (1.2 ha). In Tigray and Amhara, the average landholding of the miners is less than 0.5 ha (SUDCA, 2013).

The FGD and KII reported that because of repeated climate change and crop failure, the engagement of local people in artisan mining has been increasingly intensified. Therefore, access to mineral

deposits has an important role in determining the livelihood of artisan miners, and hence has a strong effect on miners' decision to stay in the mining site permanently or temporarily. However, the KII and FGD participants reported the resources (particularly Gold) are alarmingly depleting and as a result the livelihood of the miners is deteriorating.

Here, Proclamation No. 816/2013 should be strictly enacted and all illegal practitioners must be prohibited to do mining work. Imagine those people who have based their livelihood on artisan mining for ages. The maximum license is for two years, and the chance to transform to (special) a small-scale miner is rare, as they may not be able to meet the requirement. Even if they qualify, their maximum stay in the mining would be no more than 12 years all together. So, what would happen to their livelihood if these traditional miners have to leave the site after two years? Note also that they have accumulated indigenous skill in mineral exploring and mining practices - implying a loss of huge knowledge capital.

The coming of new entrants (new licenses for new miners) could be appreciated from the point of view of fair benefit share, but it would be at the cost of those people who have already been there and who

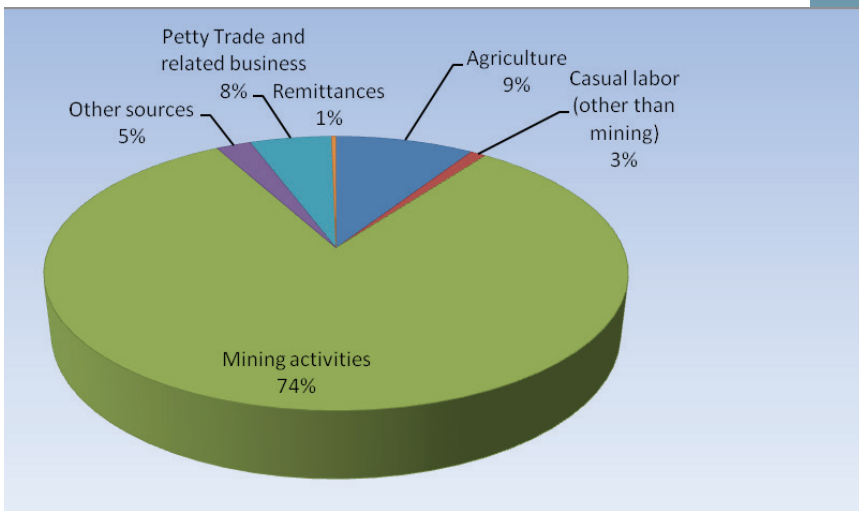


Figure 3: Major Sources of Cash Income for Mining Households

are now forced to stop their mining as their licenses have expired and now their livelihood is threatened. The continuous coming of new entrants every two-years will result in immeasurable cost of inefficiency (as they have no skill) in the mining sector. Therefore, the government should revisit the proclamation and save the experienced miners from losing their livelihood.

5.4 Labor Mobility/Migration-

It is common to see migrants in abundance in many artisan mining locations. Based on the discussion made with the local government officials and the communities, a migrant is narrowly defined as anybody who works at the mine and who originally lived outside the mining woreda. Based on key informant interviews with community leaders, some government offices and focused group discussions, the migrants roughly account for as high as 70% in Bero woreda of the SNNPR and about 50% in Shakiso of Oromia. According to the socioeconomic baseline survey (SuDCA, 2013), mining operation by migrants from other regional states is over 95% in Gambella and Afar regional states. However, this figure drops to 20% to 30% in Tigray and in Ahmara, and only 4.5% in Benshangul Gumuz. While the migrants from the other regional states account for

25% to 30% in Oromia and SNNP, the migrants to the mining communities of Tigray, Amhara and BGR are majorly from the neighbouring woredas.

5.5 Intra and Inter-Conflicts

Interestingly, the migrants and the local people are working together harmoniously, and no severe conflict has been reported in any of the mining sites in all regions considered in this study. Indeed, due to the diminishing resource of placer gold, minor conflicts exist at all mining sites caused by theft of deposits from someone's pit, cross boundary movements in search of new deposit sites, etc. Scarcity of water is also becoming a source of conflicts.

Serious conflicts exist between artisan miners and large-scale miners. Such conflicts are observed between MIDROC and artisan miners in Shakiso (Laga Dembi) of Oromia and between HARVEST Company and artisan miners in Lailay Adiabo (Addie-Nigisti) in Tigray. The root cause of the conflicts is the overlapping of the mining sites. Unfortunately, it so happens that both the large-scale private miners and the artisan miners are officially and legally given the same sites, which is the problem of good governance. The artisan miners have been originally in the mine sites for years. It is the private mining companies that later came to the site because of the attractive resources. Therefore, since mining is the sole means of livelihood for a considerable number of households, it is feared the conflict is expected to be worsening in the future unless the artisan miners are fairly compensated or a clear demarcation of boundaries is established. The choice would depend on further analysis of the actual socio-economic situation on the ground.

5.6 Access to Basic Infrastructure

Water: Though there is a gradual improvement from time to time, artisan miners are the most disadvantaged group of the society in accessing basic infrastructure. Discussants in the community and experts in the line department of government offices revealed that access to safe water is very rare or non-existent (< 15%) in many mining communities of BGR, Oromia, Amhara, Tigray and SNNPR. The safest potable water is found from protected springs and wells, and piped water supplies are nearly non-existent.

Health: Similarly, coverage of the health facilities for mining communities is lower than the national standards per the category of health facilities, especially in SNNP and Oromia mining woredas. Specifically, at the level of the mining communities, access to health service is very poor. In some cases, there are health posts or clinics but are not fully functional due to lack of human power and inadequate working facilities. The key informants and FGDs estimated that the average distance from villages of households to the health posts/clinics is estimated at 5 km and ranges from 2 km to 15km.

School: - There is at least one primary school in each artisan mining community, which is a good progress as compared to 10 years ago, when it was very absent. However, because of ragged terrain and high temperature, it still takes children, on average, 1.5 hours to reach their school (i.e. a distance of 5 km on average). The result of the FGD revealed that this is too long time and consequently school enrolment is the lowest and illiteracy is the highest (> 65%) in those communities, relative to the rest of the country.

Road: The Government of Ethiopia is trying to connect each kebele with gravel roads. The mining communities are also seemingly connected. However, the road condition is very poor and risky for regular travel. Thus, access roads make it extremely difficult to transport mining and agricultural products from the mining sites to the nearby town. As reported by focus group discussants, children and women, carrying babies on their backs, walk, on average, over 5 to 10 km to reach the mining sites.



6. ARTISAN MINING OPERATIONS

The study particularly focused on two most important minerals: Gold and Gemstone (Opal). In this chapter, traditional techniques of resource localization, extraction, processing and marketing are discussed as a value chain approach.

6.1 Artisan Resource Reconnaissance

Major locations of minerals, particularly gold and gemstones, are indicated in Figure 2, and Table 4. Here, more detailed information is provided for gold and gemstone.

Gold: Traditionally, placer gold mining has been practiced commonly along alluvial gold deposits or along an extension of such zones. However, in such localities, the resource is nearly depleted in all mining sites in the country. Thus, there is a complete shift to exploring for new resource sites for gold mining. The search is usually made up the stream within the catchments or across the mined alluvial gold plain, valleys and small tributaries. Wherever old grains are observed, the prospecting continues until the real target deposit is discovered. Traditionally, mineral reconnaissance of deposits is mainly the duties of the elders. However, these days, mining is practiced, here and there, on the hill sides, valleys and flat lands of a suspected area, and as such no restriction is made in cross boundary movement of the miners (i.e. across kebeles or woredas within the regions). Therefore, the artisan mining communities do localization of the gold resources simply through “*trial and error*” method.

Table 4: Major Mining Locations and Estimated number of Artisan Miners

No.	Region	Zones	Number of Woredas @	Estimated Miners @	Major Minerals mined
1	Amhara	North Wollo, North Shewa	5	18,660	Opal
2	BGR	All zones	13	110,950	Gold
3	Oromia	Guji, Borana, W/Wallaga, K/Wallaga	13	650,200	Gold, Tantalum
4	SNNPR	Mizan, Sidama,	4	320,100	Gold
5	Tigray	N/w Tigray	5	160,000	Gold
	Total		40	1,259,910	

Source: @ Regional and woreda offices; * computed based on information from the KII with experts at woreda, zonal and regional levels and triangulated with FGD at community level

Gemstones: Prospecting for gemstone in artisan mining is unusually rare, because gemstone is a rare and scarce mineral and rarely occurring in the nation's land. Its quality depends on colour, purity, workable size, non-fractured, broken. Quality **Opal** was first discovered by local people in Wadla and Dalanta woredas, North Wollo in Amhara Regional State. Recently, the Regional Mine and Energy Agency did some prospecting work, located potential Gemstone localities and organized interested members of the community into mining cooperatives. However, the miners also found new Opal areas by their own methods. A similar practice was done for **Tantalum** in south Oromia, Borena zone.

6.2 Artisan Mining Operation

6.2.1 Form of Organization and Employment in Artisan Miners

As described above, the artisan miners can be categorized as licensed (legal) and unlicensed (illegal) groups. Many manuscripts of the government and development partners estimated the number of artisan and small-scale mining activities (who participated in the mining of any minerals) throughout the country at one million people only. Moreover, such reports estimated the direct and indirect beneficiaries of artisan mining at 5 million people. However, based on site observation and discussion with local officials and mining practitioners, altogether, number of artisan miners of Gold and Opal in the major producing areas alone is estimated at about 1.26 million people (Table 4). Note that this figure is significantly higher than the estimate often indicated in different reports, yet without considering those people involved in the mining of other minerals (such as salt, dimension stones, sand, clay, etc.) in the study areas as well as gold in the other regions, like Afar, Gambella, Somali, etc.

Therefore, we argue that if all the minerals and regions were considered, the number of artisan miners would at least be estimated at 1.5 million people, and the sum of direct and indirect beneficiaries would be 7.5 million people. Major reasons for such a larger estimate of artisan miners include: (i) recent government policy to encourage the youth to aggressively engage in mining, (ii) diminishing farm income due to climate change and (iii) increasing inflow of migrants.

Of the total estimated number of artisan miners, about 94% are operating informally (unlicensed) and only about 6% are formally organized and licensed. The licensed miners are organized into three: (i) Mining cooperatives, (ii) Small and Micro Enterprises (SME) and (iii) Mining Development Groups. In Oromia, artisan mining cooperatives have been established as of 2006, and since 2010 in SNNPR, Amhara and BGR. The cooperatives are composed of members who have originally been there and who have been individually mining the minerals since long. They have largely accumulated indigenous knowledge of mining practices. Uniquely, no mining cooperative and SME have been established in Tigray.

SMEs have also been organized, particularly in Oromia, BGR, and SNNPR. Members of SMEs are often the landless and jobless youth. SMEs were formed by the government to create job opportunities. They may lack adequate knowledge of mining practices. The formation of artisan mining Development Groups is particular to Tigray region. The group's background is similar to that of SME. The mining cooperatives and the SME hire labourers. The laborers can be from the members themselves or outsiders. However,

this is not the case with the MGs in Tigray as the members mine by themselves.

Thousands of Mining Cooperatives, SMEs and the Development groups have been established so far (Table 6). However, there is no adequate information on how many of these are really functional and successful. Discussion with officials and local miners reflected that quite a large number of them have disappeared or have been dissolved and rejoined informal (illegal) mining practices.

Table 5: Number of Cooperatives, SME and members Organized for Artisan Mining

Region	Types of Organization	Number of the group	Number of members
Benshangul -Gumuz	SME	33	903
	Coop	81	3,984
	Total	114	4,887
Oromia	SME	137	3,569
	Coop	360	12,688
	Total	497	16,257
Amhara	SME	Na	0
	Coop	40	44,000
	Total	40	44,000
Tigray	SME	0	0
	Groups	Na	Na
	Total	Na	8,740
SNNPR	SME	Na	Na
	Coop	Na	Na
	Total	Na	Na
Total			73,884

Source: Woreda Mine and Energy Offices of the Respective Regions, Dec. 2015

Note: Na- Information not available

A substantial number of miners all of the country are unlicensed (so called illegal). They do their mining anywhere they think the deposit is available. Interestingly, members of cooperatives and SMEs, as well as members of development groups, also practice illegal mining. The illegal miners dominate the artisan mining operation. They do exist mainly due to the inability of the government to stop illegal mining because of lack of budget, human resource and logistics for monitoring. Yet, it would not be easy to stop illegal miners as it will be socially and economically costly. The local leaders understand that these people seem to be aggressive and violent, maybe because they are located in remote and in border

areas. They claim that they are born there and God has given them such precious minerals as the only resource for their survival. Therefore, they are always ready to fight for survival irrespective of the issued proclamation.

6.2.2 Extraction of Mineral

Extraction process of gold and gemstone is selectively explained in this section. There is no defined working time in mining operations. Mining is practiced during the day and sometimes during the night (with the help of flashlights). On average, every body works eight hrs/day and 20 days in a month. But due to frequent holidays the number of working days falls to as low as 15 to 17 days/month for Christian Orthodox followers in Tigray and Amhara regions. Mining is practiced early in the morning and late in the afternoon to avoid strong sunlight. Mining is heavily practised during the rainy season as water is available for washing. Students also are engaged in mining during this time as it coincides with their school vacation.

Gold extraction techniques vary with the nature of the gold deposits, depending whether it is placer or hard rock deposits. **Placer deposit** is a place where gold grains are found in stream sediment (river gravels, beach sands, etc.) and other unconsolidated materials. **Hard rock** deposits are found where gold grains are in layers or in mineral grains, generally distributed throughout a mass of actual rock.

Open surface mining: This is majorly for placer deposits, which consist of stream sediment panning and strip mining; the process is done by removing (stripping) surface vegetation, dirt, and if necessary, layers of top soil or boulders in order to reach ore deposits closer to the earth's surface. This is the simplest and less labour-intensive mining often carried out at family level. Women are most involved in the mining of placer deposits. However, placer deposit is nearly exhausted everywhere in Amhara and Tigray, though there is still some potential in BGR, Bero of SNNPR and Shakisso of Oromia.

Open-pit mining: It consists of open pit-shallow depth and open-pit deep hole, which involves discovery of gold ore from an open pit in the ground. Open-pit mining is very common across all regions and very dominant in Oromia, SNNP, and Tigray. Men are mainly engaged in open-pit mining. In alluvial gold, Artisan Miners dig pit to reach the payable gravel (gold bearing layer in alluvial deposits) which goes as deep as 5-10 meters in some localities and goes deeper to 20-40 meters in some areas. We learnt from the survey that the participation of women tends to decrease as the mining goes deeper and deeper while that of men increases.

Sub-surface mining: This consists of digging tunnels or shafts into the earth to reach buried gold ore deposits. Although the practice is not common for artisan miners, it is increasingly practised in BGR, Oromia, and SNNPR.

Extraction: - Processing method of gold depends on the source of gold- placer or hard rock (lode). Gold processing involves the mechanical means of crushing, grinding, and washing that enable the separation of gold grains from its gangue (waste material). Gold panning is the most common



technique of pacer gold extraction/processing in the study woredas. Some miners do practice repeated grinding and then panning to extract gold form a hard rock (lode mine). (See pictures taken during the field survey).

Adult men dominate all the series of activities in gold mining - digging, rock breaking, grinding and transporting. The involvement of women in the mining activities is prominent in transporting, washing and providing support (goods and services). Women's engagement in digging and/or breaking rocks is uncommon.

Gemstone mining is not relatively complex, but it is labour intensive and risky depending on the technique used. The extraction of gemstone from the host rock body in placer or primary deposit or fresh rock is done through open-pit mining, tunnelling, and panning. The gemstone mining in different woredas is different depending upon the type of gemstones.

Opal mining is unique and different from the others. Opal is mined mainly in Amhara regional state, using **tunnelling techniques** as the opal horizon is between massive and columnar basalt sequences. Thus, the horizontal layer is tunnelled to the height of 0.5 to 1 meter which makes the underground mine tough. So far, the maximum lateral distance into the tunnel has reached 80 meters in Dalanta Woreda, Tsahay Moucha site.

Open-surface mining (stream sediment digging/excavation) is being practiced in part of the active alluvial and delluvial sediments in small first order creeks. Such mining practice is very common and extensive in Yabello Woreda of Oromia, where women are largely engaged.

The common gemstone extraction method is hand picking from the host rock, gravel or soil (gemstone gangue). This is done for opal in Amhara and sapphire in Oromia. Crushing/grinding is not a common and best method of artisan gemstone extraction/processing. In terms of division of labour among the family members, involvement of women in gemstone processing is very uncommon as gemstone processing is primarily the job of adult men.

6.3 Minerals Production

Estimating volume of production of minerals by the artisan miners is very complicated due to lack of historical records and suspicions by many producers to give information. Here, rough estimation for gold production/year is made using the following simple formula:

$$\text{Total gold production/year} = \text{Average gold produced by an individual per month (kg)} \times \text{number of months worked in a year} \times \text{total population involved in the artisan gold mining}$$

As it is very hard to know how much an individual produces, this formula is based on many assumptions.



Assumptions

Mining is not a regular and permanent activity for the majority of the artisan miners. In all mining sites, only few miners are operating throughout the year (estimated just at 15% of the total miners). Some work only for three months, others for six months and a few for nine months. This discrepancy happens for several reasons:

- It is a risky business and hence the probability of earning enough is low, and so risk averters drop quickly;
- The operation is tiresome and boring and hence people want to take break;
- In some areas, water is a critical problem and work only during rainy season;
- For some people, mining is an additional source of income, supplementary to farming.

Accordingly, the number of effective time allocated for artisan mining for all is roughly estimated at **six months**. Average production by individual miners is obtained from repeated results of FGDs and KII in different locations and regions.

Total population involved in gold mining (legal and illegal) is estimated to be 1.24 million as indicated in Table (6). The result of the analysis shows that, in the major gold producing areas of the country, a total of about **18,000 kg** of gold was produced in 2014. The largest production is recorded in Oromia followed by SNNPR.

Table 6: National Estimated Gold Production in Major Production Areas (2014)

Region	Gram/person per month (a)	Total population involved (b)	Quantity produced by Artisan (kg) © =a×b×6 months
1. Oromia	2.3	650,200	8,973
2. BGR	1.6	110,950	1,065
3. SNNPR	2.8	320,100	5,378
4. Tigray	2.7	160,000	2,592
<i>Total (gold)</i>	-	1,241,250	18,008
5. Amhara	-	4,000	(Opal)

Source: Own survey (FGD and KII)

6.4 Marketing of the Minerals

As mentioned above, artisan mining is practiced by both legal and illegal miners. Similar to production of artisan mines, marketing of the minerals does also exhibit both formal and informal channels (see Figure 4). The thicker/darker arrows show the formal channel of transaction and the dotted arrows show the informal channel. Simply based on data of gold supply to the National Bank of Ethiopia in 2014 (Table 7), in relation to production estimated (Table 6), the volume of transaction in the formal (legal) channel is estimated at 39% of the total production (i.e. $(18,000 \div 7,036.5) \times 100$). The minerals are collected by the legal buyers at the production site (from both legal and illegal producers), and directly channelled to the National Bank of Ethiopia for export.

The remaining balance (61%) goes through the informal channel. Resources flow to the informal market from both illegal and legal producers through the illegal traders. Discussants explain that a great proportion of the informally purchased gold ends up in smuggling (this needs further verification study). A significant proportion of the mineral in the informal channel is presumed to be absorbed by retailers in the local and central markets in Addis Ababa (this needs more detailed market study). It is also common to see foreign tourists and passengers to purchasing refined gold and opal from the central markets, hence informally exported. The major reason why producers prefer to to sell their mineral to the informal traders is to avoid government's claim for royalty.

Table 7: Gold Supplied to the National Bank (2013 - 2014)

No.	Purchasing Branches of Commercial Banks (CB)	Amount (kg)	
		2013	2014
	Hawassa CB	3,303.1	2,906.6
	Jimma CB	1,359.8	0.0
	Mizan CB	0.0	775.3
	Assossa CB	1,007.1	1,088.5
	Mekele CB	254.1	0.0
	Endeselassie CB	2,407.0	2,266.1
	Total	8,331.1	7,036.5

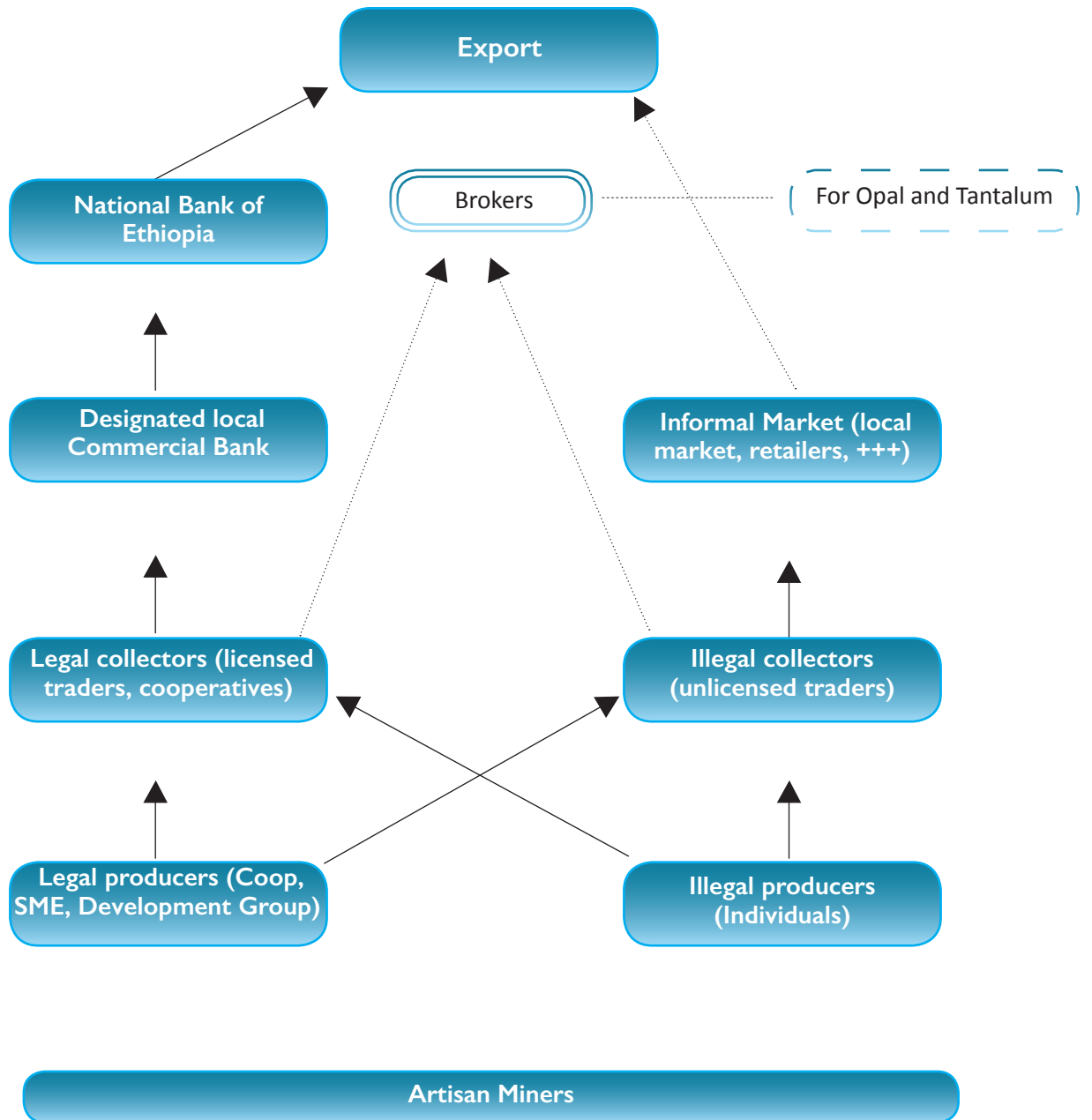
Source: EEITI, MoM, Dec. 2015

The market for opal and tantalum is not well defined and hence dominated by the informal market. Unlike in the case of gold, the National Bank is not involved in the marketing of opal and tantalum. Thus, the market channel of opal and tantalum is largely manipulated by local brokers and is suspected to be exported but through undefined manner. Thus, the market for these two commodities is so imperfect that producers have no clear price information, no bargaining power and no defined quality standard. Discussion with the producers and local key informants revealed that in the end the benefit is often unfairly skewed towards the brokers and the traders and not towards the actual producers.

The price of gold is often regulated by the National Bank for the defined quality standards, with a 5% premium on top of the current gold price. In the same fashion, the price of opal is determined by the Ministry of Mines. While the mineral prices are largely governed by global market, the need for qualified market analysts in the National Bank and MoM is of paramount importance to set fair price for the local producers. However, the information is that such qualified experts are missing both at regional and federal levels.

Although producers' access to gold price information is better these days than any other time, producers still do not have full information about the prices vis-à-vis the quality standards of the mineral. Therefore, the ultimate price makers are again the local traders and the brokers. As a result, different prices are set for gold of similar quality in different locations.

Figure 4: Market channel for the Artisan Mining Products (Gold and Gemstone)





7. ECONOMIC CONTRIBUTION OF ARTISAN MINING

The contribution of artisan mining to the economy was roughly estimated at micro and macro levels, based on secondary and primary information collected during the field visit.

7.1 Contribution to the Micro Economy

Artisan miners were afraid to report their actual income on a monthly basis mainly as most of them are informally producing and selling minerals and are afraid of the legal consequences of not paying royalties to the government. Therefore, the income at individual level was roughly estimated. However, to make a good estimation of the figure, smart cross-cutting interviews were carried out with large number of discussants at the field with mining practitioners, and local collectors. In artisan mining, there is no daily income as such because there is no production of minerals on a daily basis. Therefore, estimation of income could at most be done on a monthly basis. Thus, key variables taken for the estimation of individual incomes from artisan mining include: (i) quantity of mineral produced per month, (ii) number of working days in a month, (iii) number of months worked in a year and (iv) total sales of mineral during the month.

Individual level estimation of an average income from artisan mining was done for the study areas, taking the prevailing prices at the respective mining sites. Accordingly, the highest average annual individual income from gold was 10,800 birr in the sample area of SNNPR, followed by 10,530 birr in Tigray. The average income for the miners in the sample areas Oromia was 8,625 birr and 4,800 birr in BGR and 8,200 birr for opal miners in the sample areas of Amhara (see Table 8).

Table 8: Average Annual Individual Income from Gold and Opal Artisan Mining

No	Regions	Birr/annum	Mineral
1	SNNPR	10,800	Gold
2	Tigray	10,530	Gold
3	Oromia	8,625	Gold
4	BGR	4,800	Gold
5	Amhara	8,200	Opal

Source: Own estimation based on FGD and KII during the field visit

While artisan miners in sample areas of SNNPR earned the highest, those in BGR earned the lowest. Note that the average income does not necessarily indicate the potential of the resource deposit as the number of effective working days in a year and prices of the product in the specific locations have a determining factor.

Besides the artisan miners, other value chain actors are also making a living out of mining. The gold refiners, opal lapidary technicians and traders/brokers do benefit perhaps better than the actual producers. Particularly, the traders/brokers gain a price margin (profit) of at least 10 birr/gram (in Tigray) and as large as 50 birr/gram in BGR and Oromia. Most of the mining cooperatives and SMEs have accumulated millions of birr from the artisan operation.

Consequently, there is a clear dynamics in the livelihood and socio-economics of the artisan miners and the communities of the mining areas.

- First, their livelihood is gradually shifting from agriculture to mining as artisan mining, as a source of income, is increasingly dominating the agricultural sector. More importantly, it has become the sole source of income for some people. This is mainly because of the decline in agricultural productivity due to climate change and due to the influx of landless and jobless youth from different corners of the country.
- Second, a considerable number of miners have improved their lives: they have constructed modern houses and have developed good household capital. Now they are able to finance family food supplies, clothing, health care and other responsibilities in a sustainable manner.
- Third, a substantial number of young miners are squandering their rich income on alcoholic drinks (like beer). Prostitution is also very high in the major mining sites and many are highly vulnerable to HIV/AIDS.

7.2 Contribution to the macro Economic

Artisan mining is often carried out informally and is prone to substantial fluctuations in production and prices, and hence it is not easy to get actual and reliable figures. Thus, figures discussed here are only those officially reported and may underestimate the actual situation that attributes to illegal producers and traders.

7.2.1 Income to the Regional and national Economy

The Mining Proclamation obliges payment of royalty by any level of miners. Accordingly, artisan miners are obliged to pay royalties. The regional governments attempted to implement collection of royalties through their respective offices of customs and revenue at zonal or woreda level. Simply based on the interest of the regional governments, rate of royalties payment widely varies across regions, ranging from 8% in Oromia and 6% in Amhara to as low as 3% in Tigray. The SNNPR has exempted artisan miners and payment of royalty as of 2015, which is exceptional.

Royalty is collected only when the producers report their annual income from the mining. Thus, the amount of royalty to be collected absolutely depends on the good will of the producers. They are expected to genuinely report their income, which is often not the case. In this regard, no government control measures are visible.

However, results of observations during the field visit show that regional governments were not adequately collecting the royalties. The key reasons were: (i) largest proportion of the mining operation is done by illegal miners; (ii) even the legal miners are not transparently reporting their true income

and (iii) all government responsible bodies (like office of Revenue, Mining & Energy, etc.) lack capacity to control mining activities to collect royalties. Table (10) shows the potential collectables and the actual collected royalties. In 2014/15, SNNPR collected over 13 million birr and Oromia about 8 million birr. The remaining regions were much weaker in the collection of royalties. Nevertheless, only 36% of potential royalties was collected in 2014, which is a huge loss to the government. Oromia loses revenue of about 28 million birr every year.

Table 9: Collectable and Actual Collected Royalty on the Use of Artisan Mining (Gold and Opal) estimated for 2014/15, in Birr

	Regions	Actual Collected Royalty (a)	Collectable Royalty (b)	Loss to the government (c = a-b)
1	Oromia	7,888,153	35,892,000	28,003,847
2	BGR	340,519	4,260,000	3,919,481
3	SNNPR	13,692,148	21,512,000	7,819,852
4	Tigray	Na	50,544,000	Na
5	Amhara	274,966	1,968,000	1,693,034

Source: (a) from Woreda/zonal offices of Revenues; (b) Own calculation, based on estimated volume of artisan gold production (Table 6) and average individual income from the opal mining per annum (Table 8).

Note: Na - information not available

7.2.2 Export Earnings

The mining sector has a significant contribution to the Ethiopian economy. Production and export of gold was just US\$ 5 million in 2001 and rose to US\$ 23.8 million in 2015 and that of tantalum was US \$ 2.3 million in 2005. In 2012/13, US \$ 654 million was obtained from the export of minerals, such as gold, tantalum, platinum, and gemstones, according to the Ministry of Mines (www.waltainfo.com). The World Bank Group (2014) also reported that the contribution of the mining sector was 10% of total foreign exchange earnings, and about 2/3 came from artisan mining. In this year, the Ethiopian mining sector contributed about 1.5 percent to the country's GDP, of which the contribution of gold was more than 98 percent of the total mining exports.

As indicated below, the artisan miners contribute six to eight tons of gold every year and often generate, on average, US \$ 300 million (Table 10). In 2011/12, the amount of gold purchased by the NBE reached 8,328 kg and this increased to 8,387 kg in the following year. Nevertheless, these figures slightly decreased in subsequent years and sharply dropped in 2014/15, perhaps due to the fall in global price of gold.

Table 10: Artisan Gold Supplied to the NBE and Export Earnings, 2010/11-2014/15

Year	Amount of gold Purchased by the NBE (Kg)	Export (US \$, in millions)
2010/11	7,296.30	322.46
2011/12	8,327.73	439.30
2012/13	8,386.84	430.60
2013/14	7,559.50	305.33
2014/15	5,548.38	211.00

Source: Ministry of Mining, Dec. 2015

Yet, Ethiopia is not much known in the mining world. Except for the small-scale gold, tantalum and gemstones exports, the country is not among the list of major mineral exporters in Africa. As per the plan of the MoM, the mining sector is expected to generate 2 billion dollars by 2024. The current policy framework envisions the mineral sector to be the backbone of the industry by 2020-2023.

8. ENVIRONMENTAL ISSUES

During the field visit, the consultants were curious to understand how much the artisan miners are aware of the impact of their practices on the environment and to what extent they should be responsible for that, according to the mining proclamations. In all series of Proclamations, it is clearly indicated that artisan miners are required to “fill pits and plant trees” and forbids the use of “mercury” or similar materials”. In addition, the procedure of licensing any artisan mining group should pass through a brief environmental assessment by the office of the Environmental Protection Agency at zonal or woreda level.

However, the situation at the grassroots level does not seem to consider the proclamations or any regulation of environmental issues. The damage to the environment is enormous:

The mining practices are depleting forest, bush lands and farmlands. Producers cut trees to develop roads to get to the cliffs and around the tunnel. In BGR, it was observed excessive tree felling occurred especially in the mining villages of the region. The trees and the soil were left on the ground and no effort was made to fill the holes with soil.

In opal mining, for instance, in Dalanta woreda, the dugout rocky soil removed out of the tunnel rolled down the slope and eroded the surface soil of the slope. In some cases, the rocky soil removed out of the tunnel can be deposited in the riverbank at the base of the slope.

The stone and soil disposed is destroying the trees and vegetation down the cliff of the mountain. Land of farmers at the downstream is covered with the disposal and affects its productivity.

There can be cases where the agriculture land is found at the base of the steep slope which will be severely affected by the excavated soil, which rolled down the slope, and rainwater.

There are also incidences when agricultural lands are abandoned because of mining. In short, there appears land competition for mining and agriculture, and the latter is seriously endangered in the future.

In most cases, the pits remain open and the sites have never been replanted/ rehabilitated. The focus group respondents told the study team that there were incidences of accidents where men and animals suffered serious injuries and deaths when dumped into such pits.

In general, mining areas are vulnerable to flooding and soil erosion, and in most cases agricultural areas are irreversibly degraded.

However, no records of information have been found on the use of hazardous chemicals, such as mercury or cyanide, by artisan miners in the process of mineral extraction.

Figure: Abandoned lands in Beshangul- Gumuze and Shakisso



9. THE CHALLENGES OF MINING COMMUNITIES

1. Challenges Related to Proclamations 678/2010 later modified as 816/2013-

According to the proclamations:

No more cooperatives - thus the existing ones will die out or change to (special) small scale mining, if possible

No technology is to be used which induces inefficiency in extraction (low labour productivity) and speed up depletion of the minerals, and induce land degradation as mining practices are getting difficult due to increasing resource scarcity and inaccessibility. In this regard, a circular note from the MoM has been passed to the line regional Bureaus to consider use of simple technologies (like detectors) for artisan mining operations, but not yet put on the ground.

No employee – means only physically able people can engage – disregarding elderly and disabled people

No technical and professional competence required - this ignores the relevance of indigenous knowledge (where there is no training to improve the requisite skill as such), and aggravates the problem of inefficiency and wastage of resources and land degradation

Too short license period (two years and non-renewable.... Amended proclamation, 816/2013

The fact that the license period and operation skill are limited makes the chance of generating sizable income is totally impossible for the majority of miners. If they have to abandon their mining activities after 2 years, they will not have sense of ownership to take care for the environment. These are the situations exactly observed on the ground during the field survey.

2. Illegal system: Irrespective of the need of license, everybody is mining here and there. People think that they should not be excluded from mining as they have been mining for generations. Some others purposely do so maybe because there are local leaders or their relatives and hence are influential to corrupt. As there is no proper site inspection (monitoring) due to lack of human resource, logistics while the localities are so remote, even the licensed miners (legal) that are restricted to mine in a defined area, are actually become illegal practitioner so that they can access mining sites indefinitely. Therefore, the mining system can generally be regarded as illegal and haphazard.

3. Lack of institutional capacity and support: It does not seem that the government is giving adequate attention to the mining sector. This could be reflected in the lack of qualified professionals, budget and logistics at all regional, zonal and woreda levels. No effort was made to improve the miner's skill, raise their awareness and induce behavioural change in their saving culture and the essence of environmental protection. Beyond providing licenses, none of the affiliated stakeholders are attempting to monitor or assess the status of the miners. That is, no tangible effort has been made

by the concerned authorities to help the miners make use of their mining business. Moreover, the authorities have turned a deaf ear to the environment, which is a very unfortunate reality.

- 4. Lack of guiding rules:** - While it is a one step forward to have the Mining Operation Proclamations in place, there are no associated implementation guidelines to help government bodies properly implement the proclamation at the grass roots level.
- 5. Lack of awareness:** Concerned institutions at woreda level also do not have a good awareness and understanding about the proclamations (say, 678/2010 and 816/2013). The artisan miners also have little information on their rights, responsibilities and obligations in the mining process (such as land rehabilitation and payment of royalties).
- 6. Absence of records and database:** - Associated to the problems/challenges mentioned above (2, 3 and 4), concerned institutions fail to properly record incomes of the artisan miners and collect royalties. They also fail to properly collect and record taxes from most traders of the minerals. It also happens that even the actual taxes paid by the legal traders are not clearly known as they lack clarity. The legal traders and miners are also not transparent to disclose their true incomes. This undermines the contribution of the mining sector to the national economy.
- 7. Lack of skill and technology:** - New entrants into the artisan mining neither have the indigenous knowledge of mining nor the required technical training. This would create economically unfeasible mining system. Another common problem which is always raised by miners is lack of information on site identification and availability of mineral deposits which made mining just a random operation in most cases. The consequences could be simply wastage of labour, energy and resources, in addition to environmental damage.
- 8. Market related challenges:** The major constraints to access market were price fluctuation and illegal trade, lack of standardization and cheating in the measuring scale of the minerals. While the market for gold is regulated by the National Bank, the market for the other minerals (particularly tantalum and opal) is highly vulnerable to brokers' manipulations. The FGDs and KII in Oromia bitterly explained that, despite its high value, the market of tantalum is risky and lacked the required attention from the government.
- 9. Poor/absence of infrastructure:** - The mining sites are generally located in remote and harsh environment. Therefore, it is uncommon to observe, good condition of roads, accessible potable water, school and health facilities within a reasonable distance. The problem is more pronounced in BGR, Amhara and Tigray than the other regions. **Absence of water** for mining process (washing) has become the most critical factor in the process of mineral production. The rivers are dry during most of the seasons.

10. Sustainability:-The AM operation practices are generally inefficient and are aggravating land degradation. Artisan mining provides seed money for the ambitious young generation. Hence, the regional governments (particularly Tigray Government) should massively organize and politicize the landless youth and make the required exploration study to estimate the magnitude of the mines and the carrying capacity of the sites. The fact that the license for AM is valid for two years only means, there cannot be transfer of indigenous knowledge of mining from elders to the youth. These problems have resulted in inefficient mining (wastage of resources). Such a short life licensing for mining has resulted in lack of ownership by the miners. Moreover, there is no alternative means of livelihood designed for those people who have been living on the mining ever since their life once they are moved out of the sites, provided that their time to mine is going to expire as per the proclamation. This problem calls for careful and timely government intervention as far as licensing period is concerned.

10. CONCLUSION

Artisan mining has an immense economic and social contribution at macro and micro level. Its economic contribution, in terms of export earnings, reaches over US \$ 400 million. Every year, the government can collect royalties of more than birr 20.5 million, and this amount could be tripled, if properly collected. Based on this study, the sub sector has employed at least 1.26 million artisan miners in major artisan mining operation areas. The employment of 1.26 million miners directly or indirectly supports over 7.5 million people. On average, the income to individual miners is estimated to be 8000-10000 birr per annum, but with a very high standard deviation of the benefits at all locations.

Despite the actual and potential economic values, those occupied in the AM extraction and processing of minerals are amongst the poorest and most marginalized members of society. It is fraught with dangerous and illegal practices with serious implications for security. The trade system typically exploits highly vulnerable individuals and groups. Some key features of the artisan miners are as follows:

(i) Socio-economic set-up

- Most are subsistence (survival) miners. They lack opportunities to link revenue generated from Artisan Mining with other sustainable economic sectors.
- They use outdated mining technologies and so extraction is poor and inefficient, labour productivity is low with diminishing returns
- Most miners work seasonally, to return to their subsistence farms when agricultural work is required in order to supplement their insufficient incomes.

(ii) Legal practices

- Artisan mining sector could be described as chaotic with little respect for law and order in many mining areas.
- The vast majority of miners and mineral traders are operating informally without valid licenses (e.g.; artisan mining license)
- The government has enacted legal issues through series of proclamations to address the mineral operations in Ethiopia, including artisan mining and transaction of precious minerals, but implementation of legal enforcement work at grass roots level is weak.

(iii) Public support

- No professional support:- No technical assistance to identify the placer/ mineral potential sites and no skill training,
- Lack of access to improved technology appropriate to artisan mining
- Lack of basic infrastructures (road, health centres, potable and working water, etc.) in Artisan Mining localities
- Remoteness – most artisan mining sites are in remote rural areas scattered throughout the country, lack access to water, road, etc.

(iv) Environment and Health Safety

- High level of land degradation and deforestation activities
- Lacking safety legislation; it is a risky occupation - exposed to dust, poor ventilation, rock falls/ collapse, water born diseases, malaria and HIV/AIDS

(v) Marketing

- The role of National Bank of Ethiopia is to buy gold at different mining areas to greatly reduce gold smuggling; Yet, at local market, traders and brokers undermine the prices of gold by creating confusion about the quality standard of the mineral.
- Lack of access to fair markets to sell opal and tantalum – the demand side is not clear, and there are no defined buyers and prices are absolutely determined by the brokers/traders.

(vi) Poor collection of payment and recording

- As explained in the above section, for many reasons, the responsible government bodies are generally weak in collecting payment from the artisan mining communities.
- Even for the collected payments, there is no proper recording system.
- There is also no data on the income profile of the mining.

II. RECOMMENDATIONS AND THE WAY FORWARD

Artisan mining is a livelihood for millions of people and it is significantly contributing to foreign exchange earning of the macro economy. However, the current system is just a mess – full of illegal practices, by both licensed and unlicensed miners. This cannot continue as it is. Therefore, the government should choose either to work aggressively to stop illegal artisan mining or make it free to everybody. If the first option is the choice, then proper inspection, recording, and monitoring and evaluation of the whole system should be in place. This calls for strong political commitment of the government. Therefore, the following recommendations include a systematic approach of the problem and to improve the sub-sector and to generate information for the EEITI process.

- 1. Enhance capacity of service providers:** - Building the human and physical capacity of the MoM and line Bureaus and offices of the regional governments should deserve first priority. This, in turn, requires fundamental change in allocating adequate capital and operation budget, equipping with logistics (vehicles) and recruiting additional relevant professionals. Once these are fulfilled, the following recommendation could become appropriate.
- 2. Raising awareness of the public on legal rights Related to the AM:** - In line with the mining operation proclamations, the service providers, miners and the community at large should be well aware of their legal rights and obligations. Implementation guidance should also be developed in the social, economic and cultural context of the mining communities. Presently, AM is regarded just a source of seed money – get some money from extracting the mineral and then go away for another business leaving the site for the other poor. However, we need to be sure whether or not there is an alternative livelihood (business opportunities), otherwise it can create a socioeconomic chaos to the existing community. Feedback on the strength and weakness of the proclamation should be clearly reflected to ease the implementation process.
- 3. Enhancing public support:-** This includes the following areas:
 - a. Conducting rapid exploration to identify mineral deposit sites** -due to lack of full information about the mining sites, miners are scrambling here and there considerably wasting their time, energy and wastage of land. Therefore, there should be more study to

identify and delineate AM sites so that miners become more efficient and land be rescued from severe damages.

b. Introducing simple technologies: Although the proclamation does not encourage the use of technologies, creating access to better equipment and simple technologies for extracting and detection tools shall be useful to improve efficiency or to reduce wastage in the artisan mining process.

c. Improving marketing system: To enable the artisan miners to get stable and predictable revenues, it is important to establish/create market linkages and access to price information. More importantly, the current market channel is a mix of illegal system undermining the contribution of the sub-sector to the economy. Thus, it needs to improve the marketing channel towards a more legalized system. Thus, the role of the Ministry/regional bureau of Trade should be strengthened to support the MoM.

d. Technical and skill training: The miners in the study area need technical training and guide with regard to the mining techniques and processing and safety measures in order to make their daily mining drudgery and their other business activities friendly. The training should also include all awareness creation for zonal and woreda experts of relevant stakeholders about the basic concepts, requirements and significance of the EEITI.

e. Appointing a Technical assistant at Kebele level: - Unlike in many others, the mining sector does not have a technical staff to support the communities at the grass roots level. Considering the ecological situation and remoteness of the mining operation areas, it is difficult (if not impossible) to offer any technical support and to closely monitor the mining practitioners on a regular basis. Therefore, the government should assign a technical assistant at kebele level (the smallest administrative unit).

4. Database development and documentation for the EEITI Process: - The central point for the EEITI process is data generation and consolidation. Then, it can further go to develop a culture of regularly reporting, publishing and distributing of important issues to enhance transparency and accountability of the stakeholders. Noting that all of the above recommendations are critically complementing one another, the following points are worth considering for the EEITI process:

a. Enhancing artisan mining as a formal business- Understanding should be developed to sense that AM be regarded not just as a short-term source of seed money but also as a formal business entity.

b. Training on data recording: It is fair to assume that there is meaningful data regarding the artisan mining, or it is fragmented here and there. Therefore,

- First, consult the responsible bodies (particularly Bureaus of Mining and Revenues) to nominate people to be trained on how to organize available data on key parameters and report to the EEITI Secretariat.
- Second, deepen the training down to the artisan mining community to generate a baseline data. In this case, the kebele technical assistant (to be appointed) should be trained on record keeping on key parameters in a simplistic manner; say, list of miners in a group, number of days worked in a month, amount of the mineral produced and sold as well as issues related to the environment, incidence of risks, etc. Such training can be done at woreda level by cascading approach. A data collection sheet can be prepared by the zonal or woreda offices to be provided to registered miners.

c. Establishing database management unit: - In order that the EEITI be effectively functional, the data should regularly be collected, cleaned and be available on line for timely reporting. This calls for the need to establish a database management unit at each major woreda (district), Regional Bureau and the MoM.

5. Further research: - While the available information is very useful as input for policy and strategic interventions, a more detailed quantitative study is also strongly suggested to corroborate estimation of volume of artisan mineral production and marketing.

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