The Character and Profile of Artisanal and Small-Scale Gemstone Mining Community in Taita Taveta County, Kenya

Seroni Anyona and Bernard K. Rop

Abstract — This study focuses on the artisanal and small-scale gemstone mining community in Taita Taveta County with the objective of assessing their demographic profile and how their lives have been affected by the mining activities. The County is endowed with a wide variety of some of the rarest gemstone in the world. These include the famous Tsavorite, Ruby, Tourmaline and Saphire, to mention just a few, which have attracted a substantial number of people both from within and without the county forming a unique community whose lifestyle is dictated by this economic activity. Understanding the characteristics of this community would be critical for policy makers, planners and other institutions or individuals interested in providing support or any interventions. The study was carried out in the field by visiting and interviewing approximately 150 Artisanal and Small-Scale Miners (ASMs) who were actively involved in gemstone mining, 20 local brokers and 10 key landlords. The respondents were asked to indicate their knowledge and understanding of the ASM sector and how it relates to their day-to-day lives and socio-economic activities. Some of the areas of interest to this study were: mining experience, marital status, education level, gender, market access, contribution to household income and equipment used. This paper discusses the analysis of data collected and makes recommendations. Most of the respondents interviewed had worked as miners for a period ranging from 1 year to 46 years.

Keywords: Artisanal miners, gemstone, socio-economic, respondents, data collection

I. INTRODUCTION

In many parts of the world, artisanal or small-scale mining (ASM) activities are at least as important as large-scale mining activities, particularly in terms of the numbers of people employed. ASM can play a crucial role in poverty alleviation and rural development; most of those involved are poor and mining represents the most promising, if not the only, income opportunity available. However, the sector is perhaps better known for its high environmental costs and poor health and safety record. Many continue to view it as dirty, unprofitable and fundamentally unsustainable [1,3, 30, 31].

Irrespective of one’s perspective of whether or not the sector is a net contributor to sustainable development, the fact remains that small-scale and artisanal mining activities will continue for at least as long as poverty continues to necessitate them. It is therefore essential that effort be made to maximize the benefits brought and enabled by small-scale mining, and to mitigate the costs [30].

Understanding the socio-economic dynamics of any ASM community is the first step towards designing and implementing sustainable interventions.

The Taita Taveta gemstone ASM community is a loose amalgamation of people from a wide spectrum of backgrounds gathered together for a common purpose. The key purpose is to eke a living from the gemstones. Their lives have been affected by the mining activity and the objective of this study is to paint a picture of this community depicting their interactions, way of life, perceptions and believes and how they have responded to the demands and challenges presented by dealing in gemstones.

A. Study Area

This study was carried out between August and October 2014 by a team of professionals in Taita Taveta County. The County lies in the south-western part of Kenya’s coast. It is bounded by latitudes 37°00’00” and 39°00’00” East and longitudes 2°30’00” and 4°30’00” South. It is approximately 200 km northwest of Mombasa and 360 km southeast of Nairobi. It borders Makueni, Kitui and Tana River Counties to the North; Kilifi and Kwale counties to the east; Kajiado County to the Northwest and the Republic of Tanzania to the Southwest.

The county has an undulating and raged terrain with an altitude ranging from 500 m to almost 2,300 m above sea level with Vuria peak being the highest. The rainfall varies according to the terrain with the lower zones receiving an average 440 mm of rain per annum and the highland areas receiving up to 1900 mm of rain. The population of the county 30 years ago was approximately 45,000 persons but this has shot up to well over 284,657 persons (2009 census) with population densities ranging from 3 persons per km² to more than 800 persons per km².

The county covers an area of 17,083.9 km² (6,596.1 sq mi) of which a bulk 62% or 11,100 km² is within Tsavo East and Tsavo West National Parks. The remaining 5,876 km² is occupied by ranches, sisal estates, water bodies...
such as Lakes Chala and Jipe in Taveta and Mzima springs, and the Hilltop forests which occupy less than 100 km² or approximately 10 km² out of 587.5 km².

The lowland areas of the county that do not belong to national parks or ranches are divided into estates and wild life sanctuaries. The county has approximately 25 ranches. The main land use in ranches is cattle grazing. The three operating sisal estates of the district are the Teita Sisal Estate, Voi Sisal Estate and Taveta Sisal Estate. The ranches are also used for wildlife conservation and tourism. The famous Taita Hills and Saltlick Lodges sanctuary are located in the county.

The economic activities practiced in TTC by the local communities are livestock keeping, small-and large-scale mining, small-scale subsistence farming and small- and micro-enterprises and/or businesses. Some of the people are employed in various public and private institutions in the County.

In 2007, the then Taita-Taveta District was split into two districts: the Taita District and the Taveta District. The two were subsequently merged to form Taita-Taveta County. This consists of four constituencies namely, Voi, Mwatate, Wundanyi and Taveta. There are 20 county wards which include Mwanda/Mgabe, Werugha, Wumingu/Kishushe, Wundanyi,Mwatate, Bura, Chawia, Wusi/Kishamba, Sagala, Kaloleni, Kasigau, Ngolia, Mahoo, Bomani, Mbogoni, Ronge, Mbololo, Marungu, Chala, and Mata.

B. Economic Geology

Geological reports of surveys carried out at different times in this region show the presence of mineral deposits in the County and the neighboring areas. A report by Horkel (1980) shows that parts of TaitaTaveta County has high and middle value gemstones including; Tsavorite (green garnets), red garnets, ruby, change colour, blue sapphire, pink sapphire, green tourmalines, yellow tourmalines, rhodolites and kyanites[27]. The main gemstone mining area in Kenya is in the Tsavo region, which derived its name from tsavorite [2]. Many small mining operations are located along a fault system extending from the Taita Hills of Kenya to the Umba Valley in northern Tanzania, passing through the Tsavo, Kasigau and Kuraze areas. This is where Campbell Bridges discovered tsavorite in 1971 and where his company continues to carry out mining. TaitaTaveta County is currently the main source of Tsavorite in the world.

Rubies are associated with ultramafic rocks while greengrossularites (“Tsavorite”) is strata-bound. Other gemstones include blue zoisite (“Tanzanite”), andradite, Red spinel, turquoise, and Amethyst. The production of graphite, particularly from the Chawia deposit may also prove economically feasible. Less promising mineralization, mainly with a potential for domestic markets, are magnesite and asbestos occurrences in ultramafic bodies or kaolin and magnetite deposits. The development of bulk commodities such as marble and structural stone depends mainly on an adequate local market potential.

Marble is available for quarrying east of Mwatate on a small scale. Owing to a high Mg (Magnesium) content, the rock is not suited for the manufacturing of cement, but merely for burning to produce lime, and as dimension stone or aggregate. Small quarries for basalt, gneiss and lapilli supply the local requirements for road metal and aggregate. Ample resources of these low-value bulk commodities are readily available for development if required by increased local demand. Building stones (tuffs) are currently being quarried near Taveta town and there is a potential for further expansion if more resources are invested and the demand is right. There is sufficient supply of sand to satisfy the needs of the area and even surplus to sell to the neighbouring counties.

TaitaTaveta County is therefore endowed with one of the richest minerals deposits in Kenya and the Eastern Africa region [15].These include both industrial minerals and gemstones, which have the potential of generating considerable wealth to various mining prospectors and investors [1]. But this wealth does not trickle down to the local people. According to Mwandawiro (2011), this wealth continues to benefit middlemen, brokers and other players along the supply chain while poverty in the county continues to spread unabated. Furthermore, the mining is often carried out without clear government regulations and control [28]

C. Definitions and General ASM Characteristics

Broadly speaking, artisanal and small-scale mining refers to mining by individuals, groups, families or cooperatives with minimal or no mechanization, often in the informal (illegal) sector of the market. Despite many attempts, a common definition of ASM has yet to be established. In some countries a distinction is made between ‘artisanal mining’ that is purely manual and on a very small scale, and ‘small-scale mining’ that is more mechanized and on a larger scale. This is the definition that is used in this paper i.e. artisanal miners are those without land allocation of their own and use purely manual mining methods and are largely illegal and informal. On the other hand, Small-scale miners are those with mining licenses and land allocation and carry out mechanized mining albeit to a small scale considered legal and formal.
Artisanal mining may be better characterized by a lack of long-term mine planning and use of rudimentary techniques [10, 11]. These artisanal miners employ rudimentary techniques for mineral extraction and often operate under hazardous, labor-intensive, highly disorganized and illegal conditions. Despite these factors, artisanal mining is an essential activity in many developing countries, particularly in regions where economic alternatives are critically limited. The International Labor Organization [13] estimates that the number of artisanal miners, in the world, is currently around 13 million in 55 countries. This figure is roughly equivalent to the global workforce of large-scale mining. From this, it has been extrapolated that 80 to 100 million people worldwide are directly and indirectly dependent on this activity for their livelihood.

Approximately 30% of the world’s artisanal miners are women and youth who occupy a number of roles ranging from labour-intensive mining methods to the processing aspect of artisanal mining. In many cases, the roles of women and youth in artisanal mining communities differ significantly from those of men, and extend well beyond direct participation in mining activities that are often overlooked by initiatives and development programmes directed at catalyzing the transformation of artisanal mining. Due to their critical role, not only in mineral production, but also in the development of sustainable communities, combined with their susceptibility to poverty, enhancing the role of women in artisanal mining may be a means to “bridge the gap” between the well-conceived technical and socio-economic changes often prescribed for artisanal mining, and the actual facilitation of positive transformation of the artisanal mining sector. This may be accomplished in a number of ways, such as Gender-sensitive technology assistance initiatives – Gender [3] refers to the behaviors, attitudes, values, beliefs, etc. that a particular socio-cultural group considers appropriate for males and females.

D. The Relevance of the Study
Most of the research and publications done regarding the gemstone sector in TaitaTaveta County address the natural science and geological issues, since they are driven by prospector, investor and trade interests. Consequently, little has been published about the, social-economic dynamics and how mining activity has influenced the lifestyle of the mining community and the general populace of Taïta Taveta County (TTC).

This calls for a focused in depth research to profile and evaluate how the demands and challenges posed by gemstone mining have dictated the social setting, communal organization and family stability of ASMs in the study area. Critical here is the need to include the relationship between the people of the mining areas affected, the environment and the mineral resources. Such research would also need to explore more cogently why local people continue to be losers in the exploitation of the mineral resources in their ancestral lands, and what should be done to correct this in order to promote sustainable development. Given that Taïta-Taveta County is endowed with abundant minerals it was important to find out how the social fabric of the local people has been affected by the influx of a none-native population and the resulting community.

It is also important to determine the benefits accruing from an industry that is reputed to make billions of shillings in profits annually, and whether the profits made from the sector trickle down to the community and whether benefit sharing between the investors, communities and government, are comparable to international best-practices. This information would prove invaluable to agencies, donor community, individuals and governmental institutions interested in planning, designing and implementing interventions focused on ASMs in TTC.

II. PROFILING THE ASMS
Most artisanal mining in TaïtaTaveta is rudimentary in nature; the miners mainly use easily available explosives to break down the rocks in search of gemstones and precious metals. The health and environmental risks are enormous. Besides these issues, the markets for gemstones are not well established – a few dealers and brokers still control the entire process; the small-scale artisanal miners in TaïtaTaveta have limited market powers. It has been reported that there is a big black market for gemstones. The miners also lack the technical knowhow, capacity, to correctly value the gemstones.

The artisanal miners are predominantly men with little or no education. They have little or no income but big expectations. Almost all interviewed artisanal miners expressed very high optimism that they will one day strike it rich. They have undivided attention to their work and would never consider abandoning it. They have an obsession for their work that...
keeps them going even under very hostile conditions. This is almost like a fanatical commitment.

Artisanal mining typically uses manual labour, simple tools, and basic recovery and processing techniques. Small-scale mining is also labour-intensive but also employs a higher level of mechanization and more sophisticated processes. ASM is frequently migratory as miners move from site to site in search of minerals. The rate at which they move, and the area within which they travel, are functions of a combination of practical, economic and social factors including the life of the mine; the lure of high value mineral strikes in other areas which create a ‘rush’ to that site; relocation by traders; pressure from conflicts; exclusion from a site by new restrictions such as the arrival of a large-scale mining company; rain and the availability of water; environmental shocks; and the agricultural seasons.

A number of them do not have land of their own so they often carry out mining ‘illegally’ in ranches and other privately owned land or in the neighbouring Tsavo national park. They are commonly referred to as “Zururas” meaning marauding miners or ‘miners without borders’. However a significant number of them have now formed associations or cooperatives and have staked claim on some ranches. They however lack the necessary land ownership documentation such as title deeds, and this has been the main source of the mining conflicts in the area.

Due to lack of financial capital, most artisanal miners, work under some ‘land lord’ who supplies them with the much needed food, water and shelter and whatever mineral they recover is shared out with the land lord taking the lion’s share. The desperate circumstances they work under expose their vulnerabilities making them easy target for exploitation by predatory middlemen or brokers. From the field interviews it would appear that it takes so long to get gemstones of economic value. A number of them cannot recall recovering any valuable gem in the last six months to one year. However it is said that when they get good quality gemstones and make significant amounts of money, they indulge in excessive leisure, drinking, taking foreign trips abroad and purchasing lavish cars and would only return when the money is exhausted – then the cycle repeats itself again.

The trade is fraught with dangerous and illegal practices, and, it can have serious implications for security. It can create localized and far-reaching social risks, and typically exploits highly vulnerable individuals and groups.

There are few small-scale miners who have made good money from the industry and established themselves well. These often have land of their own with title deeds and practice mechanized mining with a good network of clients locally and internationally. They have invested their income elsewhere especially in real estate in major or nearby towns like Voi and Mwatate and they often act as landlords or brokers to the artisanal miners. With their enhanced capital base coupled with their understanding of the area, this category of small-scale miners, standout to be the greatest beneficiaries of the mining industry in this area.

There is however a different category of artisanal miners in the area; those involved in building stone quarrying and sand harvesting. The former group is found near Taveta town and the later at Ongoni area along the Voi River (and other rivers in the area). Unlike gemstone miners these ones operate from their homes and are less optimistic about the future and are less secretive in their dealings. They also assist the county government in collecting cess from Lorries that come to collect building stones. Fewer conflicts have been reported from this type of miners compared with those from gemstones though they have less income. These often use mining as a supplementary source income apart from farming, which also promotes seasonal work patterns.

Small-scale mineral producers form the majority of mineral dealers in Taita-Taveta. These small-scale miners can be categorized according to the size of mining area, number of people employed or involved and volume of production and profits they make. They use simpler, fewer and less sophisticated tools and machines. Most of them are self-employed and work in groups of four - eight, comprising relatives or neighbours. For example, in a group of ten small-scale miners, only three hire labourers. Most small-scale mineral producers depend on their own labour. They sell their minerals locally. Traders travel to buy gemstones from small-scale miners at Mkuki, Kasigau, Kamtonga, Chungaunga,
Bura, Kishushe and Wanjala. However, a few small-scale mineral producers sell their gemstones as far away as Mombasa, Nairobi and Arusha while a few have access to market outside the country.

The small-scale miners rarely access loans to invest in mining as most of them do not meet the legal requirements for mining. Whenever they discover the minerals, they are often dispossessed of the claims by the large scale-miners who employ or chase them away. They are also often exploited by brokers and the large-scale miners as they rarely know the value of their gemstones and have little access to the gemstone markets controlled by large-scale dealers. There is some symbiotic relationship between the large- and small-scale miners. Some large-scale mineral producers support small-scale miners with water, transport, food, security, and other requirements. In return, small-scale producers sell their gemstones to large-scale miners as well as provide them with relevant information on minerals potential of the area.

A. Zururas

Some producers and sellers of gemstones do not fit in the various categories of small-scale miners. They are simply known locally as zururas; a nickname for mines and mineral dealers with no legal mining rights. They are mainly poor people from all over Kenya and the neighbouring countries who operate in the plains of TaitaTaveta County and depend on gemstones for survival. They live and struggle to earn livelihoods where the rich and powerful have privatized nearly all the land that is rich in minerals.

The zururas come from virtually all the ethnic groups of Kenya – especially Kikuyu, Embu, Meru, Tharaka, Maasai, Somali, Kamba, Taita, Luo, Luhya, Giriama. Some from outside Kenya belong to the Chagga and Pare tribes of Tanzania. They roam the mining areas in Taita, scavenging for gemstones which they sell for a living. Many of them are vagabonds, being criminals who have escaped from prisons or justice systems to seek refuge in the wilderness of TaitaTaveta County. They hide in the mining areas and hardly leave the place, except for a short time at Mwatate and Voi to sell their gemstones. Some zururas are former employees of the mines who decided to continue living around the mining areas of Taita to scavenge for gemstones [34].

During the stakeholders’ workshop the term ZURURAS generated a lot of controversy and divided participants. Some participants felt that it was derogatory term and casts a negative image on otherwise genuine miners who have in a number of instances spearheaded the discovery of rich gemstone deposits.

On the others hand a substantial majority of them felt that we cannot escape the fact that Zururas exist and they have created a cartel that has no respect for private property nor the rule of law.

B. Other Producers and Dealers of Gemstones

Many other people in Taita are involved in the production of minerals and gemstones in some way. These include herders who discover gemstones, collect them and sell them to dealers. Teachers, policemen and other business persons in Wundanyi, Mwatate, Voi, Bura, Maungu, Kasigau and other places of TaitaTaveta County are also involved. But their involvement in the industry is mainly illegal. They work in mining activities to supplement their incomes. In fact, many civil servants, including district commissioners and district officers engage in gemstones production and trade whenever they are posted to work in TaitaTaveta County. Some even become small-scale miners. This happens despite fact that the law forbids it.

Some are brokers (middlemen) of minerals of all sorts at Voi, Mwatate, Kamtonga, Kasigau and in mining areas, as well as Nairobi, Mombasa and Arusha. They sponsor small-scale mineral producers or ‘zururas’ with food, water and tools on condition that the gemstones produced are only sold to them, yet some are peasants who own land which has gemstones and who lease their land to people with prospecting rights (PRs). Others are large land owners who have minerals deposits in their land. They include hotels, sisal estates and private farms. They secretly produce gemstones in their large properties.

III. MATERIALS AND STUDY METHODS

The study materials and data were gathered between September-October 2014, during an eight-day field period in the county. The empirical materials consisted of RPA (Rapid Rural Appraisal) and in-depth interviews, unstructured interviews, questionnaires and desk references, literature review of existing information, reports, journals and field observations as well as review of relevant Kenyan laws on mining. The field studies began by an excursion as part of the RRA. The interviews were carried out by the team of professionals. The study mainly focused on the areas where
most valuable took place with the TaitaTaveta County governor H.E Mr Mruttu, some members of the county assembly, mining committee especially the chairman Mr.Mwangola, experienced and long serving miners, brokers and opinion leaders. The Principal of TTUC Prof Boga and Chairman of Mining and Mineral Processing Engineering department TTUC Mr.Ndegwa added value to the study since the institution has been involved in providing solutions to the mining industry. The current government regional geologist, Mr.Omito, provided critical information and guided the research team in field excursions. The team also worked closely with the acting County Executive Committee (CEC) Member in-charge of the Ministry of Mining, Environment, Wildlife and Natural Resources, Ms. Pamela whose input and information regarding the industry was invaluable. The questions were open-ended to elicit broad insights from the respondents on the extractive industry in the county, the activities of their organizations, the challenges faced and their recommendations. The questionnaire used is annexed to this report.

In total, over 150 artisanal miners were interviewed, 20 local brokers and 10 key small-scale miners namely; Musa G. Njagi, Gabriel Mcharo, Miceni Musa, Edith Lewela, Joseph Mtwandei, Major Mtongolo, Jared Nzano, David to mention just a few, were also interviewed in-depth.

A. Sampling Technique

The sampling method used for research should ensure that the selected subset is representative of the population in order to increase reliability and validity [35]. This study attempted to use both probability sampling and non-probability sampling during selection of the artisanal and small-scale miners as well as brokers and other stakeholders.

The study involved both quantitative and qualitative methods. However, more emphasis was put on qualitative field data collection. The aim was to generate living data on mining in Taita-Taveta by interviewing the stakeholders in the mining industry in the area.

The past media coverage of the mining activities in TaitaTaveta County and the associated political dynamics were also examined to highlight the socio-political nature of the industry and the ensuing conflicts.

This study used a two-tier sampling method including the random sampling and simple random sampling. Simple Random sampling essentially gives equal chance of selection to all items or persons in a population [36]. This method is fair and gives all sampling units an equal opportunity of being selected. Additionally, a simple random sampling method allows researchers to draw inferences and generalize the findings of the study.

B. Stakeholders’ Workshop

After the completion and compilation of the field study a stakeholders’ workshop was held to disseminate the study findings and receive feedback from the participants. The mining communities were represented by different groups and/or individuals involved in mining.

C. Numbers of ASM Workers and Dependents
It is notoriously difficult to collect accurate information on this sector given its informal and unregulated nature, seasonality, migration, use of ASM as a supplementary or back-up income source, etc. However, it is generally agreed that ASM is growing and this is an invisible income generating activity.

According to the national government’s records there are 512 recognized mining allocations most of which are licensed and two operating on government leases namely Bridges Exploration Ltd and Rockland (K) Ltd. Of the 512 licensed miners a number of them are out of operation due to various reasons ranging from attrition, financial problems, conflicts and other personal problems.

Apart from government records we were able to get lists of members of a number of mining associations and self-help groups (see table below). The estimated number of dependants can be computed by using the 2009 population and household census which gave an average of 6 persons per household. Assuming each member of the associations identified below represents one household and that each has children, then the number of dependants can be estimated by multiplying the number of members by six.

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of Association/Co.</th>
<th>Est. No. of Members</th>
<th>Est. No. of dependants (times 6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mkuki Mine</td>
<td>140</td>
<td>840</td>
</tr>
<tr>
<td>2</td>
<td>TaitaTaveta Women Mining Group-Alia</td>
<td>300</td>
<td>1,800</td>
</tr>
<tr>
<td>3</td>
<td>MuunganoGwaloli Mining Group-Buguta</td>
<td>150</td>
<td>900</td>
</tr>
<tr>
<td>4</td>
<td>TimboMlimani</td>
<td>400</td>
<td>2,400</td>
</tr>
<tr>
<td>5</td>
<td>TimboKubwa</td>
<td>150</td>
<td>900</td>
</tr>
<tr>
<td>6</td>
<td>Lukundo Mine</td>
<td>100</td>
<td>600</td>
</tr>
<tr>
<td>7</td>
<td>Alia Mining C.G</td>
<td>234</td>
<td>1,404</td>
</tr>
<tr>
<td>8</td>
<td>Licensed miners</td>
<td>512</td>
<td>2046</td>
</tr>
<tr>
<td>9</td>
<td>Rockland (K) Ltd</td>
<td>41</td>
<td>246</td>
</tr>
<tr>
<td>10</td>
<td>Bridges Exploration</td>
<td>6</td>
<td>36</td>
</tr>
<tr>
<td>11</td>
<td>Tsavolite Mine</td>
<td>41</td>
<td>246</td>
</tr>
<tr>
<td>12</td>
<td>Ongoni area-Voi River(sand)</td>
<td>50</td>
<td>300</td>
</tr>
<tr>
<td>13</td>
<td>Wanjala Mining-Kishushe</td>
<td>600</td>
<td>3,600</td>
</tr>
<tr>
<td>14</td>
<td>Mama Mercy Miners</td>
<td>200</td>
<td>1,200</td>
</tr>
<tr>
<td>15</td>
<td>Others</td>
<td>300</td>
<td>1,800</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>2,684</td>
<td>19,344</td>
</tr>
</tbody>
</table>

This is a very rough estimation which excludes miners that do not belong to any association and operates on many assumptions. But even going by this alone, one can get an impression of the sheer size of people who directly or indirectly depend on this industry. This is considered an underestimation and therefore a much larger number of people are supported by the extractive industry in this area.

IV. SOCIAL IMPACTS OF ASM

ASM can have significant negative social impacts as an influx of miners to an area can cause overcrowding, contamination, and consumption of the area’s water and other resources, as well as introducing or escalating alcohol abuse and sex-trading. ASM can change an area’s economic profile dramatically bringing in new revenue sources, stimulating trade, and creating access to new goods and services, but often at the expense of traditional income sources and with associated inflation.

Key mining town centres such as Mwatate and Kasigau have experienced major transformations in the last two or so years as the number of artisanal miners keeps increasing. Changes in the moral fabric of the towns have been witnessed with an evident increase in alcoholism and sex-trade. Business owners however are happy with the increased sales and money circulation in the local economy fueled by the new guests. Real estate owners have also hiked their rents and more people are investing in house construction which also comes with economic ripple effects.

Conflicts over land and mineral resources are commonplace in Kasigau, Chungaunga, Kamtonga, Mwachabo, Alia, Kishushe and other parts of Taita - especially in the lower zones where mining is a major economic activity. Wealthy and politically-connected individuals, mainly from outside of the county, have a stranglehold on the industry; they acquire the right to prospect for minerals in the area from the administrative centres of Nairobi, Mombasa and the area district headquarters at Wundanyi often without the participation of the local communities [19].

Conflicts between small-scale gemstone miners and large-scale gemstone miners arise because most of the land in the lower zones of Taita-Taveta County is not demarcated; the general feeling is that the locals have been robbed of their land and resources.

A. Political Impacts of ASM

Mining being one of the main income generating activities in TaitaTaveta County, is bound to attract a fair share of political attention. While political intervention is inevitable and could positively impact the extractive industry by focusing attention on the plight of the artisanal miners, most of it has been negative, divisive and to some extent selfish. Exploiting the dire and deplorable state of the artisanal miners for political expedience is common and may not be unique to this area. Targeting non-locals for blame as contributors to the poor state of the local community can be appealing to the voters and may offer temporary politically mileage but it cannot provide a lasting solution to alleviate poverty among the electorate. What it may succeed to do however is to create a feeling of distaste for non-locals and generate conflict.

This is currently developing in the area and people generally feel that the poor small-scale miners labor for many months and years to prospect for the minerals; but they are often violently evicted from the mines by powerful and well-connected large-scale prospectors, miners and traders who claim legal ownership of the land as soon as the locals...
discover mineral deposits. Residents around mining areas complain of human rights violations by the police and the rich and powerful miners. Their complaints include cases of arbitrary arrests, torture, imprisonment, and even murder. These have been reported mainly in Kishushe, Mwachabo, Chungaunga, Kamtonga, Kasigau and throughout the other mining areas.

B. Issues Appearing in the Kenyan Print Media regarding ASM in Taita Taveta County

To help put the issue of ASMs in TaitaTaveta in context, it was thought necessary to review the relevant matters appearing in the local print media. A number of past newspapers were reviewed and emerging concerns were summarized.

- Mining in TaitaTaveta County started in 1970 and so far 483 industrial minerals and 197 semi-precious minerals have been discovered.
- The most common issue appearing in the media since the year 2002 is the conflict between miners over land and minerals. It is reported in a number of occasions that some Small-scale Miners (SSM) carry out mining without seeking consent from locals. Conflicts have been reported at Mkuki mines where at one time (2006) two groups clashed over ownership. In the year 2009, a private miner at Mkuki, Lukas Kitumbi (Chawia Garnet) had his daughter killed and wife injured by thugs and gemstones worthy millions of shillings were stolen. In 2005 a confrontation erupted at Mgama hills between squatters seeking to encroach on private land of about 28,000 acres. SSMs, being issued with exclusive prospecting license illegally and excluding locals from the vast idle mining fields.
- The other frequent issue that has been appearing on print media is the politics of minerals and mining. Sometime around 2004 the then Voi Member of Parliament led three thousand demonstrators to protest against poor management of ASM and mining issues in general. They wanted the District Commissioner (DC) transferred for failure to address the problems of wealthy investors in the mining industry oppressing locals. Days later, 45 out of 70 ASMs from Chungaunga were arrested while trying to invade Davis Mining and were released without being charged.
- Then around 2008 the former Voi MP Basil Mwakiringo lamented that the government was registering behind doors companies belonging to KamleshPattin and Gideon Moi to mine in Tsavo National Park. He wondered why the government had allowed some companies to prospect and mine in the National Park while denying others.
- In 2009, Mwatate MP CalsitMwatela blamed the provincial administration and geological department for taking sides and suggested that mine owners issue their workers with badges to help screen out criminals and the government to increase police posts in the mining areas.
- Around 2002 the then Mwatate MP Hon. Madoka wanted to know what the government was doing to regulate prospecting and mining. He felt that Kshs 250M received as royalties from mining activities in 5 years was too little and wanted better monitoring of the industry. Chamber of commerce and industry chairman, Kimuzi Mjomba recommended that a mines office be set up in the area.
- The issue of brutal killings also attracted media attention. In 2009 three gemstone miners were killed and 10 injured. The same year there were more reports of killings some of which were ritual – some miners are reported to rape mentally handicapped women in the hope of getting good luck when they go mining. August 2009 the Chairman of Kenya Chamber of mines – Campbell Bridges was murdered.
- The fact that the area has great wealth but the local people are poor has been a matter of concern to all, the media included. The gemstones form TaitaTaveta are the second largest income earner in the county – Kshs.500M earned from the industry for the last 6 years. Gemstone exports accounted for Kshs5B (out of 11billion nationally) compared to gold (Kshs 3.5B) and Kshs7.5B from soda ash. In 2003 the country earned Kshs 8B from the gemstone industry and ASMs contributed about 80% of this. In 2003, 6g of cut and polished gemstone could fetch Kshs. 270,000 while the raw gem would fetch Kshs 15,000. However roads leading to these multi-million mining sites are in a deplorable state and there is lack of clean water. Locals always complain about poor facilities in the area despite the area having vast resources and miners claim that they are being exploited by mine owners. Nine people died due to mine-related accidents, two buried alive at Mwatate – 1 stepped on an explosive at Kasigau.
- Some local leaders have been calling for sobriety in the area: Edith Lewela (TT SSM cooperative secretary) said the area would lose investors if illegal mining by gangs is not stopped. Some...
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C. ASM and Government

It is certain that artisanal mining contributes extensively to the economy of a country. As a source of wealth creation, ASM has led to job creation, abating poverty and in some instances complementing other economic activities such as farming. This ensures that a family has multiple sources of income that when combined are able to sustain livelihoods.

As stated earlier, ASM is informal and the activity is termed “illegal” as most of the individuals or groups do not have the necessary permits or licenses which allow them to conduct mining operations. The activity involves the use of rudimentary tools or if mechanized, only to a small degree translating to low production that cannot be equated to the energy input. This then culminates into subsistence commercial gains that only add a small value in the lives of the miners.

In many countries, including Kenya, ASM has not been accorded its due share of attention due to its informal nature. It is therefore not integrated and thus not among the country’s major economic activities. ASM may be marginalized economically compared to the formal mining sector but it is by no means marginal in human and environmental terms [15]. A wide range of challenges can be attributed to ASM, key among them, is the negative impacts of ASM. Environmental degradation, effect on biodiversity, uneconomical mining practices as well as health and safety concerns are some of the issues that paint a bad picture to ASM. Other challenges experienced in ASM are that of legislative, organizational and social nature.

Artisanal mining is less environmentally sustainable when compared to other formal forms of mining. The reason for this is that inadequate economic profits are not generated to compensate for environmental degradation and the depletion of the mineral resources [30, 33].

The government has lost a considerable amount of revenue associated with ASM due to the existence of a black market. This is as a result of government’s inability to properly regulate the sector, complicated procedures required in marketing and sales arrangements and high tax rates imposed on the mining activities. This makes the black market the only available alternative. Presence of a black market indicates that a particular country’s government is not in control and therefore investors (mostly foreign) are discouraged from investing in such a country. This hinders economic development on a macro level as it only benefits a few players whose agenda is limited in the perspective of public interest.

Sub-economical mining which means extraction is limited to the equipment available, manages to extract the minerals that are accessible leaving those at specific depth, a consequence of artisanal mining. Proper mining practice dictates mining both the low grade and high grade to achieve the cut-off grade as demanded by the prevailing market conditions. This is however not the objective in the mining plan of ASM as the better grade you mine the higher the economic returns. The government’s involvement in ASM, through financing, can aid in the acquisition of proper equipment to boost or lobby for economic mining.

Unregulated artisanal mining has led to failure in observing high health and safety standards. Although artisanal miners understand that their activities can affect their health, they still don’t know to what degree. Many have developed health complications after being exposed to toxic substances or due to inhaling materials considered harmful to their respiratory system. Accidental injuries are common in ASM and in extreme cases deaths have been reported. Most of the mines are not properly ventilated and stability of the mines is usually in question as the roof supports are usually not adequate. Instability in mines (roof caving) and poor or lack of proper ventilation may lead to deaths in artisanal gemstone mining areas in Taita-Taveta County.

D. Character of Mining Groups and the Role of Government

As mentioned earlier, the ASM sector in Taita-Taveta County has been a mystery and at the mercy of cartels and well-connected individuals who have quietly benefited from the enormous wealth that is associated with gemstones. For this reason, very few artisanal miners were involved and only until recently with the opening up of the sector have mining groups and CBOs come up. Mining groups mainly include several individuals who mine under a common consent that is issued to the group. There usually exists a leadership structure which helps to govern the group’s day to day operations. Community based organizations (CBOs) have also of late been formed that are involved in gemstone mining. These organizations are registered with the social services department and are recognized as entities by the government.

Most of the CBOs involved in mining usually consist of individual artisans who also mine under a common consent acquired by the CBO. The CBO also assists the miners in acquiring equipment such as compressors which can come in the form of aid from the county government and in return the miners’ part with a percentage of the total revenue from any sales they make which goes to the CBO. These groups and CBOs provide a good platform through which the authorities can reach them and provide financial and technical assistance even though the County Government has been doing little to assist. There was also at some point a small-scale miners cooperative which was started in 2005 (Taita-Taveta small-scale miners co-operative) and acted as an umbrella body for small-scale miners to front the collective agenda. However, the cooperative did not last for long as political influence and internal bickering led to its disintegration.

Co-operative structures have had limited success within ASM in this county as profit-sharing is not popular in the extraction of precious metals and stones. However, where associations are established for legal compliance and to improve access to other resources, they may have greater impact. Interventions which improve product valuation skills and knowledge, marketing skills and access to new markets through technology, ASM bourses, auctions, etc, can also improve ASM as a livelihood.
E. Relationship between Artisanal Miners and Small-scale Miners

Any given ore body has its own unique mode of formation and occurrence and this will in turn dictate how its extraction will be carried out. The characterization of the ore body (i.e. its location, depth, extent, grade, quality and quantity) plays a big role in determining how the ore body will be mined and as such, there is a role for all scales of extraction. Artisanal and small-scale mining are all appropriate approaches depending on the location, volume and value of the resource. Gemstones as minerals also have their unique mode of formation and occurrence. In most cases, gemstones occur in concentrated forms that are not extensive and as such would warrant very careful extraction techniques to be employed.

Artisanal miners have been able to survive in the gemstone mining sector by virtue of the fact that they can easily prospect for a potential reef and dig along it and find whichever stone and in doing so using the most basic of tools. This way, the artisans are able with a minimum of capital investment, albeit with maximum physical effort, to still find gemstones which they can sell at a price that represents sufficient compensation for their effort. Small-scale miners are able to put in some degree of mechanization into the extraction process and at the same time employ several people to carry out the mining operations.

In the Gemstone sector in Taita-Taveta County, these small-scale miners represent the scale at which there is sufficient financial muscle and influence and they are the ones that hold the largest land consents and licenses. Only small areas within these consents are of interest to the miners with most of this land remaining idle yet there may be small but significant deposits of commercial value that could be efficiently exploited by artisanal miners using manual labour. With increased interest and presence of artisanal miners in gemstone mining areas, land is beginning to unfold as a major issue which will have to be addressed if a sustainable gemstone mining sector is to be established in the county. Land conflicts can prove to be a major stumbling block if not resolved and avenues will have to be established to see how best the artisanal and small-scale miners can co-exist so as to ensure gains from the sector contribute significantly to the socio-economic development of the area.

The conflicts arising from land can be solved by small-scale and artisanal miners entering into agreement to share land under consent which is currently idle but has some potential for gemstones. This has been the major source of conflict in the area, together with other factors, and has led mostly to the locals encroaching on consented land which they feel they are entitled to but cannot access it. And since most of the authority governing mineral extraction in the county is vested in the central government, it plays a major role in solving conflicts and land issues as regards to gemstone mining. Land, especially in mining areas, has and will continue to be a delicate matter that requires an all-inclusive approach. There has to be the political will from both the County and National government that shows a genuine concern and intention to solve this matter and make it possible for any person willing and able to engage in gemstone mining to do so. This will go a long way in ensuring that all stakeholders in the sector (i.e. the National and County government, Small-scale and Artisanal miners, among others) benefit from this resource.

V. ASM METHODS, PROCESSING AND PROMOTION OF VALUE ADDITION

Artisanal and small-scale mining is carried out in many different ways depending on tradition, geology, geography, the nature of the minerals, and available resources. Prospecting and exploration are usually done in the most basic manner and uses a mix of tradition, opportunism, rumours, observation and luck, all these techniques being refined and perfected over a period of time. The main indicator of presence of mineralization is alluvial deposits which the miners first dig up and then follow underground. Over time, artisanal miners have developed an understanding of the local geological formations in which these gemstones occur and this has acted as their guiding principle in the prospecting and digging operations. Very few if any, mostly small-scale miners with access to geological information, employ the use of formal prospecting in their mines. Lack of information and therefore a lack of in-depth understanding of the geology of these gemstone mining areas hinder the efficiency of mining as most operations essentially amount to trial and error, wasting a lot of time, effort and resource.

Mining operation of any ore body can either be underground or surface, and it ranges from manual to mechanize. Gemstone mining also follows this trend, most of it beginning from alluvial deposits on the surface and then advancing underground depending on the mineralization. Alluvial deposits of gemstones were a common occurrence in the early days (60’s, 70’s, 80’s) when the sector was budding with only a few people involved, but with more and more players coming into the picture, it is very rare to find alluvial gemstones these days. Most gem mining is done underground at present with mineralization tending to occur deeper and deeper in the ground as near surface deposits become exhausted.
Mining of these deposits is a tedious undertaking given the effort required to break rock and primarily involves the use of hammers, chisels, shovels and buckets and in some advanced cases drills, compressors, explosives and excavators. Artisanal miners usually apply the most basic of techniques to laboriously dig up box-cuts then tunnels underground as they follow mineralized reefs/zones.

Loose soil normally forms the overburden but this soon turns to hard host rock which requires immense effort to dig through. This is done manually using hammers and chisels, pneumatic rock drills and aided in some cases by prior blasting to loosen the rock. Tunnels dug out in this manner in some instances go more than 50 meters underground, with diameters large enough to allow crawling or crouching as one goes in. Adequate space is, however, provided at the work front to allow for digging and movement of material. Waste rock is usually removed manually using shovels and buckets or sacks but as the tunnel gets deeper, removing waste becomes a tedious task; with most miners preferring to spread it on the tunnel floor or collecting it in one area.

Small-scale miners employ more or less the same method of mining, the only difference being that they are able to employ machinery such as excavators, generators, water pumps etc. This enables them to mine in a relatively more planned and structured manner as compared to artisanal miners owing to more information, better prospecting and a larger pool of resources. In both cases, support of the mined out areas is not of much concern to the miners as they deem the host rock to be competent enough to support itself, though few pay attention to the fact that it is dangerous especially during the rains.

Most of the gemstones once mined, usually do not undergo any form of processing or treatment. They are just separated from the surrounding rock which they are normally associated with and thereafter sold as just raw or uncut stones to brokers who frequent mine sites, or in nearby towns of Mwatate and Voi. However, few brokers or experienced artisanal miners attempt to add value to the gemstones. A simple process may involve: separation (sorting after extracting the gemstone) this is done by hand, washing (using water) and shining (using glycerine).

A. Value chain for gemstones

B. Access to Finance and Credit

Artisanal miners account for a larger percentage of the populace involved in the extractive industry in TaitaTaveta County as compared to those in small scale mining (Financially able to support themselves), which in our case is relatively considered to an extent, as large scale mining

Lack of proper capital base has culminated in ASM lagging behind in terms of sustainable development. There has to be a long-term financing that is efficient from the prospecting and exploration stage right through to the closure and reclamation of the mines. Access to capital is a major stumbling block affecting most of the ASMs in TaitaTaveta County as this was highly evident from the fieldwork conducted. Prospecting, exploration and other mining activities for example, demand a lot of input on the part of potential miners. The energy invested are usually rendered useless as lack of proper prospecting, exploration and mining tools coupled with the little or non-existent technical knowledge become a trial and error exercise which in most instances does not amount to any significant gains.

Artisanal mining in the case of TTC is mostly carried out in group ranches which operate on communal basis and therefore no specific individual can lay claim to a piece of land endowed with minerals. Other ASMs are lease holders to sections of land that are either communal (e.g. Tsavolite Mine in Kasigau Ranch), or privately owned by the locals or land owners. In the process of raising funds, ownership status of a given location can be an inhibiting factor as it can discourage investors who tend to look for a stable investment. This means that investors prefer to buy land or if in a partnership co-own the land or simply partner with the owner of the land with minerals.

Literacy levels in most of the ASMs in Taita County is still low as majority of the miners lack the knowledge required to prepare documents such as a business plan which is a must-have for any investor or a financing institution to even entertain the thought of advancing funds or credit to ASM. Other documents required by banking institutions include; a feasibility study report, mining licence, a document detailing repayment plan for the Credit and a proof of a market for the product to be produced. The business plan for example has to reflect the quantity and quality of mineral reserve in question and involves other technicalities of costing and analysis in order to achieve breakeven point. The afore-mentioned would be a jargon to most of the miners although a few are able to prepare such documents which are needed by financiers. Such demands continue to encourage the informal nature of ASM hence minimizing the opportunities of growth that would have emerged had a formal partnership with investors been established.
ASM Can Perpetuate Poverty

As with all forms of mining, ASM is a finite activity exploiting a non-renewable resource. As such, the livelihood potential associated with any ASM site is limited to the life of the resource, which is a function of the accessibility, scale and quality of the ore, efficiency of production techniques, the market, the number of miners and the intensity of their labour (SSM CFC report, 2008). ASM can be inefficient in terms of the contribution it can make to livelihoods if it lacks appropriate and adequate technical, financial and market resources. The technical aspects of the mining, which go together with financing, have to be given close attention if any meaningful benefits are to be realized. Efficient mining can only be achieved once the technical elements are taken care of which eventually leads to better production, higher contribution to the local and national economies, and enhanced development in general.

ASM might compromise the levels of education and skills for employment of young people since most of them are tied down in the mines with virtually no time to attend educational or technical institutions. This in the long run will breed a society with low literacy levels and consequently contribute to poverty.

VII. ROLE OF WOMEN AND YOUTH IN THE ASM WORKFORCE IN TTC

Women constitute 3 to 5 per cent of the ASM workforce in TaitaTaveta County (TTC), fulfilling roles in all aspects of mining, processing, transporting, trading and service provision to the mines. Women are often subject to gender discrimination in terms of access to the resources; ownership and tenure; types of work undertaken; and pay received. They also face elevated risks in terms of health and security and, if they have to bring children to the mines with them, the children too face physical, moral and psychological risks as well as potentially being excluded from education. Women have aptitudes and potential which make them a good focus for interventions to improve ASM livelihoods, with a related positive impact for their children and households.

Women play a major role in artisanal mining than in the LSM sector, and their engagement typically declines as the degree of organization and mechanization increases (WMMF, 2000). Women’s roles vary between and within countries and frequently depend on the location (proximity to villages or homes) and mineral being mined [9, 10, 11]. In addition to working directly in mining, women often work part time at informal mining operations and occupy ancillary roles (e.g., as cooks and service providers). Because women are more frequently associated with transporting and processing materials, as opposed to digging, they are not always identified as miners [39]. Women’s involvement is often invisible, because it frequently takes place in the domestic sphere. There thus may be significant discrepancies between the estimated and actual numbers of women involved in ASM [40]. Furthermore, women typically have intensive domestic responsibilities—typically working four to eight hours more than men per day—which adds to their workload; this is largely unrecognized and undervalued.

VI. ASM AND POVERTY

ASM and poverty is closely associated and the relationship between the two is quite complex. Majority of the ASMs are driven to mining due to poverty and lack of an alternative source of livelihood. Those who constitute the majority of the ASM community at the level of resource extraction, basic processing and local trading, generally live in poverty, with the gains from these activities representing their main source of income. However, the nature of ASM is such that it is exploitative; it draws people away from other more sustainable activities such as agriculture; it does not produce long-term wealth for these individuals; it creates debt; it uses resources inefficiently; and it is not sustainable [38].

In most cases, the informal nature in which ASM is carried out results in poor return on resources and effort invested. Despite this scenario, most miners carry on with operations even though they may go for months on end without any substantial sales. This may end up trapping most of them in a vicious cycle of poverty from which it is hard to escape.

However this type of mining activity takes place in rural and remote areas of TTC where few opportunities exist for formal employment and as such, provides an alternative to large numbers of people who are generally uneducated and poor.

Since ASM are informal in nature, informal or not so formal partnerships between miners and ‘supporters or sponsors’ have been adopted in some of the mining sites. This was strongly observed in Mkuki, Kasigau and in Alia gemstone mines. The sponsors or supporters would avail the miners with food, water, mining equipment, contingency money and any other relevant item critical to the process of mineral exploitation. The same can be said of many other gemstone mines found in the other areas of the county. Most of these sponsors are exploitative as they get a large slice of the pie resulting from the sale of the gemstones as they are accorded the rights to sell the gemstone leaving only a small percentage to the actual miner. The benefit-sharing between the miner and the sponsor in most cases is unfair. This will in turn discourage the miner from formalizing the venture.

The migratory nature of ASM does not auger well with the finance institutions as it does not inspire trust and accountability in the sector, not to forget that most are informal. Some of these institutions find it hard to believe that the ASMs are capable of paying back the money if credited.

The local financial institutions lack the appropriate professional capacity to design financial products suited to the mining industry.

Existing commercial banking models are limited in their reach and often charge high interest rates while demanding collateral or evidence of sophisticated business plans. As most artisanal and small-scale miners cannot meet the bank’s requirements, innovative microfinance services tailored to diverse artisanal and small-scale mining situations are needed. Government assistance in strengthening ASM groups’ economic planning and in educating banks about this sector could be a useful step in making credit services more accessible to the poor [37].
Despite women’s significant involvement in ASM, men hold the control and ownership of most assets. Evidence overwhelmingly indicates that land (inclusive of mining areas), incomes from mining and other activities, mining and farming tools, homes, crops, and sometimes even children are primarily owned and controlled by men. Similarly, the benefits from these resources also predominantly accrue to men.

Even where men and women perform similar work, women often make less money for similar tasks.

**VIII. FIELD DATA ANALYSIS AND DISCUSSION OF RESULTS**

The data under consideration was collected during fieldwork involving approximately 150 ASMs that were actively involved in mining. The respondents were asked to indicate their knowledge and understanding of the ASM sector and how it relates to their day-to-day livelihoods and socio-economic activities. Some of the areas of interest to this study were: mining experience, marital status, education level, gender, market access, training needs, environment, contribution to household income and equipment requirement. The respondents were asked to rank in order of priority the importance of the foresaid areas. The following analyses are as a result of the data collected from the field based on an open-ended structured questionnaire. Most of the respondents interviewed had worked as miners for a period ranging from 1 year to 46 years. Most respondents were in the 10 years bracket.

**A. Marital status:**

Among the miners interviewed 71.3% reported that they were married, 24% were single, 4.7% reported to be widowed. The table below shows the distribution of the marital status.

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>71.3</td>
</tr>
<tr>
<td>Single</td>
<td>24</td>
</tr>
<tr>
<td>Widowed</td>
<td>4.7</td>
</tr>
</tbody>
</table>

Source: raw field data

**B. Education level:**

From the data collected in the field it is revealed that about 4.0% of the respondents had no formal education, 68% had attained primary school education level, 22% had attended secondary education level and 6.0% had attained post secondary level.

**C. Training:**

The study investigated whether the respondents had received any formal training relating to mining. Of interest to the study was the type of training undertaken by the miners in, geological prospecting, business, mineral identification, or Machine operation. There was also need to identify the institution of training. The respondents who had some basic training indicated they had been trained on basic gemmology and geology at TTUC.

Results revealed that 98.5% reported they had received no training while 1.5% received training on geology and gemology. Apparently no training has been conducted in business, mineral identification and machine operation, among others.

The respondents identified their preferred areas of training as follows:

<table>
<thead>
<tr>
<th>Recommended training Areas (Module units)</th>
<th>No. of Participants</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Practical Mineral Identification</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td>2 Appropriate Mining Methods</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>3 Marketing Skills</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>4 Explosives and Blasting</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>5 Gemstone cutting and polishing</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>6 Field tours</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>7 Safety and Occupational health</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8 Exploration and Prospecting for gemstones</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9 Environment and Mining</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>10 Entrepreneurial Skills in Mining</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>11 Using gemstone waste-productions</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12 Financial management</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>13 New Mining law(Act)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>14 Leadership and Org. Skills</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>15 Record Keeping</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: raw field data

**D. Gemstone buyers:**

From the table below 92.9% of the respondents reported selling their gemstones to local brokers, 0.5% to international companies, 2.0% to local cooperatives, 4.1% to registered dealers and 0.5% to others.
E. Gender:
Based on the collected field data, most of the miners were male constituting 96.6% of the total respondents’ whereas the remaining 3.4% were female.

F. Mining as a source of income:
From the data, 20.9% of the respondents reported that they had other sources of income while 79.1% indicated that mining was their main source of income.

G. Other source of income:
It was established that there are a number of miners who had other sources of income apart from mining as follows: 83.3% of the respondents cited farming as their main alternative source of income, 13.3% had business to sustain them while 3.3% indicated other sources apart from the afore-mentioned.

H. Miners’ perception on return on value for their efforts:
The following represents proportion of constituencies that generated this data. Differences were tested statistically with various indicators among constituencies at: (p*<0.01**p<0.05***p<0.001)
Proportion of value of effort based on constituency

<table>
<thead>
<tr>
<th>Constituency</th>
<th>% Very significant (N=23)</th>
<th>% Significant (N=10)</th>
<th>% Moderate (N=38)</th>
<th>% Low (N=35)</th>
<th>% Very Low (N=36)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taveta</td>
<td>47.8</td>
<td>40</td>
<td>55.3</td>
<td>42.9</td>
<td>44.4</td>
</tr>
<tr>
<td>Mwatate</td>
<td>34.8</td>
<td>40</td>
<td>36.8</td>
<td>45.7</td>
<td>50</td>
</tr>
<tr>
<td>Voi</td>
<td>17.4</td>
<td>20</td>
<td>7.9</td>
<td>11.4</td>
<td>5.6</td>
</tr>
<tr>
<td>Total</td>
<td>16.2</td>
<td>7.0</td>
<td>26.8</td>
<td>24.6</td>
<td>25.4</td>
</tr>
</tbody>
</table>

*Difference between the constituencies had no significant difference at p value of 0.756

J. Equipment support and type based on constituencies
According to field observation very few ASMs groups had received any equipment support except those in Mkuki and Kasigau ranches. Each of the two groups had received a compressor donated by the TaitaTaveta County government. However, these two compressors are inadequate to the needs of the ASMs. One of the compressors at Kasigau is currently not in operation due to lack of accessories and a skilled operator.

K. Land ownership:
It was observed that land ownership in the TTC mining areas have not been clearly allocated to the ASMs. However in Taveta most ASMs were conducting their mining activities in either privately owned or leased land, whereas in Mwatate majority operated in group ranches. Other ASMs operated in county council land. In general most respondents (53.5%) operated in group ranches while those in privately owned land and leased land constitute 18.3% and 15.5% respectively

Proportion of ownership of land mined based on constituency

Table 4 the status of satisfaction among miners with their vocation

<table>
<thead>
<tr>
<th>Constituency</th>
<th>% Yes (N=15)</th>
<th>% No (N=162)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taveta</td>
<td>54.3</td>
<td>80</td>
</tr>
<tr>
<td>Mwatate</td>
<td>35.8</td>
<td>20</td>
</tr>
<tr>
<td>Voi</td>
<td>9.9</td>
<td>0</td>
</tr>
</tbody>
</table>

*Difference between the constituencies had no significant difference at p value of 0.13

The table above shows that Taveta constituency had more miners dissatisfied with return on invested effort (80%) while 54.3% reported value for their effort. Most respondents from Voi reported satisfaction with mining as a source of income. Statistically there was no significant difference between the constituencies in terms of return on effort from mining. In general, a high percentage across the constituencies expressed dissatisfaction with return on effort from mining.
### Table 6 Proportion of land ownership among ASMs

<table>
<thead>
<tr>
<th>Constituency</th>
<th>%Private (N=26)</th>
<th>%Lease (N=22)</th>
<th>%Group ranch (N=76)</th>
<th>%Other (N=18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taveta</td>
<td>61.5</td>
<td>59.1</td>
<td>30.3</td>
<td>94.4</td>
</tr>
<tr>
<td>Mwatate</td>
<td>15.4</td>
<td>10.2</td>
<td>63.2</td>
<td>5.6</td>
</tr>
<tr>
<td>Voi</td>
<td>37.5</td>
<td>31.2</td>
<td>31.2</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>18.3</td>
<td>15.5</td>
<td>53.5</td>
<td>12.6</td>
</tr>
</tbody>
</table>

*Difference among the constituency has a significant difference at p value 0.000

### L. HIV/AIDS awareness:

The table below reveals that 43% of the respondents were aware of the HIV/AIDS prevalence in the ASM sector while 57% were unaware in the constituencies visited. Mwatate showed the highest awareness level (50%) compared to Voi which had the lowest (4.8%).

### Table 7 Perception of HIV-AIDS awareness among ASMs

<table>
<thead>
<tr>
<th>Constituency</th>
<th>%No (N=82)</th>
<th>%Yes (N=62)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taveta</td>
<td>51.2</td>
<td>45.2</td>
</tr>
<tr>
<td>Mwatate</td>
<td>32.9</td>
<td>50.0</td>
</tr>
<tr>
<td>Voi</td>
<td>9.9</td>
<td>4.8</td>
</tr>
<tr>
<td>Total</td>
<td>57.0</td>
<td>43.0</td>
</tr>
</tbody>
</table>

*Difference among the constituency has a significant difference with a p value 0.035.

### M. Accessibility to mining site:

The study reveals that overall the ASMs mining sites were very difficult to access due to poor infrastructure. Most ASMs (58.7%) in the constituencies reported great difficulty in accessing their mining sites.

### Table 8 Perception of the difficulties in accessing mining sites

<table>
<thead>
<tr>
<th>Constituency</th>
<th>%strongly agree (n=84)</th>
<th>%Agree (n=31)</th>
<th>%Neutral (n=7)</th>
<th>%Disagree (n=8)</th>
<th>%Strongly disagree (n=13)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taveta</td>
<td>42.9</td>
<td>51.6</td>
<td>42.9</td>
<td>62.5</td>
<td>61.5</td>
</tr>
<tr>
<td>Mwatate</td>
<td>50</td>
<td>32.3</td>
<td>57.1</td>
<td>1.25</td>
<td>15.4</td>
</tr>
<tr>
<td>Voi</td>
<td>7.1</td>
<td>16.1</td>
<td>0</td>
<td>25</td>
<td>23.1</td>
</tr>
<tr>
<td>Total</td>
<td>58.7</td>
<td>21.7</td>
<td>4.9</td>
<td>5.6</td>
<td>9.1</td>
</tr>
</tbody>
</table>

*Difference among constituency based on mining access has a significant difference with a p value of 0.098

### N. Effects of ASM on family stability:

The data shows that 28.4% of the ASMs strongly agree that mining leads to family breakdown. Mwatate reported the highest cases of effects of mining on family stability. However, there was a statistical significant difference among constituencies.

### Table 9 Perception of contribution of ASM to family breakdown

<table>
<thead>
<tr>
<th>Constituency</th>
<th>%strongly agree (n=40)</th>
<th>%Agree (n=17)</th>
<th>%Neutral (n=26)</th>
<th>%Disagree (n=31)</th>
<th>%Strongly disagree (n=27)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taveta</td>
<td>22.5</td>
<td>70.5</td>
<td>42.3</td>
<td>62.5</td>
<td>61.5</td>
</tr>
<tr>
<td>Mwatate</td>
<td>49.2</td>
<td>6.8</td>
<td>20.3</td>
<td>1.25</td>
<td>15.4</td>
</tr>
<tr>
<td>Voi</td>
<td>12.5</td>
<td>0</td>
<td>18.8</td>
<td>25</td>
<td>23.1</td>
</tr>
<tr>
<td>Total</td>
<td>28.4</td>
<td>12.1</td>
<td>18.4</td>
<td>22</td>
<td>19.1</td>
</tr>
</tbody>
</table>

*Difference among constituency based on family breakdown had a significant difference with a p value of 0.000.

### O. Satisfaction with mining as the main source of income:

The data reveals that 53 respondents were dissatisfied with mining as the main source of income. Among these 68% expressed dissatisfaction due to low income from mining activities, 11.3 due to unpredictable markets and lack of support from the authorities while 7.5% attributed their dissatisfaction to poor working conditions.

### Table 10 Reasons for dissatisfaction among ASMs

<table>
<thead>
<tr>
<th>Constituency</th>
<th>%Low income</th>
<th>%Unpredictable markets</th>
<th>%Poor working conditions</th>
<th>%Risk</th>
<th>%No support</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. No.</td>
<td>36</td>
<td>6</td>
<td>4</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Taveta</td>
<td>84.6</td>
<td>3.8</td>
<td>7.7</td>
<td>0</td>
<td>3.8</td>
</tr>
<tr>
<td>Mwatate</td>
<td>33.3</td>
<td>27.8</td>
<td>11.1</td>
<td>5.6</td>
<td>22.2</td>
</tr>
<tr>
<td>Voi</td>
<td>88.9</td>
<td>0</td>
<td>0</td>
<td>11.1</td>
<td>11.1</td>
</tr>
<tr>
<td>Total</td>
<td>68</td>
<td>11.3</td>
<td>7.5</td>
<td>1.9</td>
<td>11.3</td>
</tr>
</tbody>
</table>

*Difference among constituency based on satisfaction had a significant difference with a p value of 0.025
IX. SUMMARY OF THE FIELD DATA ANALYSIS:
1. From the data it can be inferred that there were benefits derived from mining. However, insignificant amounts of income generated reached the household level. This observation applies to all constituencies.
2. There is need to diversify marketing of gemstones and other minerals to fetch better prices thus increasing their income.
3. There is need for more diversified training to enhance productivity and efficiency.
4. There is need to provide adequate and appropriate equipment support to ASMs to enhance mining technology.
5. In terms of land ownership, Taveta was mostly having privately owned and leased land for mining whereas Mwatate had the highest number of land from group ranch for mining. Other land belongs to county government. Therefore, resolving land related issues will create an enabling environment for ASMs.
6. The HIV/AIDS level of awareness is significantly high among miners and cuts across all the constituencies where ASMs are conducting their activities. There is however need to educate and sensitize the ASMs through public campaigns.
7. The accessibility to most of the mining sites in the constituencies was reported as significantly poor hence efforts should be put to improve the road infrastructure.
8. A significant number of ASMs agreed that mining affects family stability and there is need to develop family support programs to mitigate the perceived negative attitude society has towards mining in the area.

There is a significant level of dissatisfaction with the return on efforts invested in mining among ASMs, thus relevant interventions to improve their income need to be effected by the appropriate authorities. Contrary to dissatisfaction, the determination of miners to continue mining defies logic.

X. CONCLUSION AND RECOMMENDATIONS
The TaitaTaveta ASM community presents both complex challenges and opportunities for initiating and driving change in the county. This community united by a common interest can be used as a force to mobilize and focus group dynamics for social development. However there is little available information regarding the demographics, socioeconomic profiles and household incomes from ASMs a situation which presents a major drawback to research and hence the in-depth understanding of this community. This kind of information, if made available, can be used to mitigate against the frequent land and mining conflicts experienced in the area.

It is hoped that with the new constitution and the proposed new mining Bill, pertinent issues affecting ASMs will be addressed more conclusively and within a sustainable framework of policies.

This study makes a contribution towards the development of a pool of information regarding this subject that hopefully, will support future research. From the study findings it could be recommended as follows.
1. Diversification of economic activities: county government with the help of other donors to support ASMs in setting up small enterprises, agribusiness, poultry and livestock farming.
2. The County and National government should give this industry the recognition it deserves and invest in it commensurately.
3. Support and strengthen the ASMs cooperative movement. This movement is currently unstable due to poor management and internal wrangles.
4. In depth study to establish how much is made and management of the revenue from sale, distribution and control of resource.
5. There is absolutely no data or information at the County or National level regarding ASMs currently. Such issues as to how many artisanal miners are in the county, the actual amount of money generated by ASM, the accurate assessment of the potential of none extracted mineral potential of the area remain unresolved. Even basic information regarding the locations in the county where mining activity is taking place is lacking. So it is recommended here that a thorough and in-depth socio-economic survey as well as a geospatial mapping survey be carried out focusing on ASMs to assist both governments and other stakeholders in planning for this key industry.

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