

Socio-Economic Impact of Artisanal Mining of Blue Sapphire on the Mambilla Plateau

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Abstract

Blue sapphire gemstone has been mined on the Mambilla plateau and traded in different parts of the world including Thailand and Sri Lanka over the years. However, the new Mambilla blue sapphire discovered recently has generated a lot of excitement in the global community because of its high quality. This discovery has led to a general rush by the people in the area mostly youths into artisanal mining of the blue gemstone. This study examines the process of artisanal mining of blue sapphire and the socio-economic impact of the mining on the environment. Data were generated through interviews with key stakeholders. Ethnographic observation of the mining site was conducted during the fieldwork. Information was also collected from relevant secondary sources including reports, books and journal articles. The Information obtained from the individual interviews and focus group discussions was content-analyzed and subjected to descriptive analysis. The finding of the study shows that the artisanal mining of the blue sapphire has created employment opportunity to the teaming jobless youths in the area. This has attracted many people from within and outside the country to the area. Although the mining of the sapphire has created wealth to the people, the negative impacts of the mining is also a major concern as large tract of forest cover and scarce agricultural land in the area are loss in the process of sapphire hunt. This study therefore recommend for the need to put in place framework that integrates the artisanal miners fully into the productive sector of the national economy and advocacy campaign to enlighten artisanal miners on the direct link between their operations and environmental degradation and the need for adoption of sustainable method of mining.

Keywords: Artisanal, Blue sapphire, Impact, Mambilla and Socio-economic

Introduction

The Mambilla plateau is one of the places in Nigeria that is well endowed with abundant natural resources. The plateau is endowed with a semi temperate climate that is suitable for agricultural crop production and livestock rearing, as well as mineral resources. Despite the natural endowment of the Mambilla plateau, the livelihood of the rural dwellers in the area has been greatly constrained by increasing population pressure on natural resource, shortage of farmlands and increasing conflicts between the Fulani herdsmen and the local Mambilla crop farmers. Mining of gemstones have over the years provided an alternative source of income to most rural dwellers on the Mambilla plateau. This is especially during the off farm season. When it was first discovered that there were stones of commercial value in the area many people became exuberantly involved, however of the amethyst, quartz, tourmaline, sapphires and green stone found in the region only sapphires proved to be of sufficient quality to be of commercial interest to the local people (Kornoefer, 2009). Individuals and groups occasionally go on gem fossicking, either on their own farms or on public land. However, because of the laborious nature of the work involved in the mining of sapphire which was not commensurate to the prices they received, people loss interest in sustaining the activity. Gem-fossicking and trading appears to have been steady at a low level since its introduction, which was allegedly some time during the mid 1980s (Kornoefer, 2009). Several times each year a gem trader from Senegal will come to the region and buy what people have found. Some individuals have even taken this a step further and now buy from other villagers and re-sell to the trader.

The Mambilla Blue Sapphire has been traded in different parts of the world including Thailand, and Sri Lanka. Gem merchants were reportedly said to be very excited by the quality and the size of the stones being produced from the site. Large clean stones were reported, some weighing between 100 and 300 carats with a nice blue color. Reports emerged that stones from the new deposit of Mambilla plateau were being traded at very high prices. One stone was reportedly sold for more than 1 million US dollars in Thailand (Pardieu *et al*, 2014). The new sapphire produced in the area looked slightly different to the material from the old diggings in the Mambilla area. The Mambilla blue sapphire is mined from basalt related secondary deposits in the area. The “classic” sapphire material from Mambilla was known to occur as small stones, usually with quite a dark blue color and a good crystallization (Michelou 2007) while the new material was much lighter and brighter (Pardieu, *et al*, 2014). Nigerian company called “Gendutse Investment” recently acquired the mining license for the area where the new discovery occurred (Ibid). The miners built large camps with several hundred houses covered with reflective aluminum roofs near the mining site (Ibid). People mine using simple hand tools such as diggers, shovels and head pans in rather shallow pits.

Mining of blue sapphire is one of the rural livelihood diversification sectors that are capable of bringing

Kakara, Nguroje, Maisamari, Ngel Nyaki and Dawa areas. The name of the sapphire mining site is Santiye (Maayo) in Nguroje. The means of movement was motorbike which takes between 30 to 40 minutes ride because of the poor nature of the road and whether it rains or not. The area is inhabited by the Mambilla people and Fulani cattle rearer along side with other smaller ethnic groups like Panso Kambu and Kaka. The Mambilla people and the other ethnic groups are mainly crop farmers.

Materials and Methods

This study sets out to examine the process of artisanal mining of blue sapphire and the socio-economic impact of the mining on the environment. Interviews were conducted with miners, key stakeholders in the Local Council Authority, traders and members of the community. Interview guide was used to collect data from these groups. The interviews were supplemented with fieldwork. Ethnographic observation of the mining site was conducted. Information was also collected from relevant secondary sources including reports, books and journal articles. The Information obtained from the individual interviews and focus groups discussion was content-analyzed and subjected to descriptive analysis.

Result of the findings

Background of the Nigeria Sapphire

Nigerian sapphires are known from different basalt related localities, all of them located within the central and eastern parts of the country (Kiefert and Schmetzer 1987; Kanis and Harding 1990; Michelou 2007; Raw_material_Research_and_Development_Council 2010): Blue sapphire is found in Gangon, Pitiko and Saladuna communities in Karim Lamido Local Government area of Taraba State. Michelou, (2007) considered this deposit to have the best commercial potential at the time.

The blue sapphire mining on the Mambilla plateau have been described by Michelou (2007). The mining sites are found near Gembu on the Mambilla Plateau close to the border with Republic of Cameroon in Taraba State. He describes the stones as usually being small but with a nice saturated blue color and good form. Michelou (2007) observed that the blue sapphire deposit extends to the other side of the border with Republic of Cameroon.

Although Nigeria is known to have rich deposits of blue sapphire, many have observed that the stones were not considered to be of very good quality by the market as most of them are too small, too dark or too included to be viewed favorably (Pardieu, *et al*, 2014). However, the recent discovery of these large, transparent to milky, light blue sapphires from the Mambilla Plateau near Nguroje, has been described as something that was never encountered before from Nigeria in terms of quality (Pardieu, *et al*, 2014). The parcels of sapphires seen from the new deposit on the Mambilla Plateau in Nigeria look particularly interesting with good combination of large size, nice form, high clarity and attractive colors.

A microscopic study of the internal features of the blue sapphire from the old and new mining site was performed at the GIA Laboratory Bangkok. The result of the preliminary analysis shows that the blue sapphire from the new mining site has an iron content that is significantly lower than that usually expected from other basalt related deposits around the world. This element in itself according to Pardieu, *et al*, (2014) is interesting for gemologists, and more importantly, traders as the lower iron content means that the stones are less likely to develop a greenish and grayish appearance after fashioning which usually correlates to a higher market value. This is particularly true for large, potentially valuable blue stones. This point alone explains why such material is generating a lot of interest within the trade (Ibid). The new deposit near Nguroje on the Mambilla Plateau seems to be producing some transparent to milky blue sapphires that appear to be colored by 2 different processes. Recently, another site of the sapphire deposit has been discovered at Mayo Sumsum around Nguroje (between Gurgu and Sabongari).

Discovery of the Blue Sapphire in the area

The old mining site on the Mambilla plateau was at Mayo Ndaga and Lekitaba. Mayo Ndaga is close to the Nigerian boundary with the Republic of Cameroon (Fig. 1.). The mines in both places stopped flourishing as a result of decline in blue gemstone and the people abandoned the site until the recent discovery. The new Mambilla blue sapphire mineral was said to have been discovered in Santiye (Maayo) area in Nguroje community between December 2012 and January 2013. From February 2013 till date it has been a beehive of economic activity in the area. Although, the harvest or yield is not regular which was attributed to many factors including changes in leadership (Chairmanship of the artisanal mining cooperative) and bad luck. The spread of the mineral is linear both in the valley and up hills. The present blue sapphire mineral in the area was discovered through casual observation. It was gathered that the blue mineral was picked along erosion deposit and was later discovered to be the blue sapphire. This was how the people started excavating the area for the precious stone. It was observed that majority of the people found on the mining sites were youths along with some few elderly persons who still have strength to dig and excavate the ground. Some of the youths engage in washing of the

precious stone while others engaged in buying and reselling of the precious stone. The ratio of male to female on the site was about 90:10 at the beginning which has increased rapidly. There is no price regulation on the sale of the precious stone. The marketing involves long chain of transaction consisting of buying and reselling on prices agreed by the parties.

Method of Sapphire mining in the area

- i. The process of sapphire mining involves clearing all the trees in the valley.
- ii. Digging pits on the floor of streams and rivers or dry surface until you come across the precious stone.
- iii. The sapphire is dug out with a digger, or by a washer sifting through mined gravel in a waterway or stream.
- iv. The water in the pit is drained out where and when necessary.
- v. The excavated gravels and muds are gathered or collected together.
- vi. The gathered gravels are washed and spread out on a clean surface, usually a sack.
- vii. The precious stone (blue sapphire) is carefully sift out from the spread gravel.
- viii. It is then finally wash to clean and,
- ix. It is packaged and ready for sale. The local people do not have any local uses for the precious stone but to sale it.

At the site, there are people who engage in the following activities;

- i. The traders who sold clothes, shoes, food stuff and restaurant services.
- ii. The tent makers who construct temporary dwelling tents for the people engaged in the mining.
- iii. The local miners who uses local tools such as hoe, cutlasses, diggers, spade, water pump machine for draining water out from the dug holes as well as sacks for washing the gravel.
- iv. The washers called 'lootobe' who washes 3 portion of same measure to be given one as their wage, making it four.
- v. The small pallces or middlemen who purchase to sell to those high bidders within the site. This helps them to atleast realize on an average five – ten thousand naira (US \$30 - US \$60) daily.
- vi. The next group of buyers is traders and merchants that are resident in the towns and they don't appear at the mining site. The only buy from the group mention above after testing to confirm the quality and measuring it on the scale to ascertain the weight in grams. This group in turn combine their purchase to sale it to the main agents or as well take it to Jos or export it to Bangkok in Thailand.
- vii. Casualties are recorded almost on weekly basis as some people asserted that while excavating the previous week they came across 3 corps of people who were buried by the collapse of the mine while digging at night. This week according to them there has been no casualty recorded.

Participation in the mining activity takes two forms;

1. By registration where the individual pay N500 (US \$3) to the chairman of the miners cooperative to obtain an identification card with their passport affix to it so as to ease identification and security while on site.
2. Free entry. This is a common pool resource that is not regulated but operates as an all comers affair. Individuals can just on arrival decide to engage in any of the activities mentioned above.

The Price and cost of the blue sapphire at the Mambilla plateau mining site

The findings of this study show that the cost of the mineral is dependent on both the quality and quantity. A whole size of quality blue sapphire (highest quality) per gram could cost up to one million naira (US \$5,920). But if you have same quality that is a whole (not splitted) which weighs higher, then that attract more money as shown below;

- i. 1 gram = 1million naira (US \$5,900)
- ii. 2 whole gram = 4 – 5 million naira (US \$23,700 - US \$29,600)
- iii. 3 whole gram = 10 – 12 million naira (US \$59,000 - US \$71,000). This varies depending on the flourishing and scarcity seasons.

Low quality sapphire

- i. 1 gram = N150,000 – N200,000 (US \$880 - US \$1,180).
- ii. 2 gram = N300,000 – N400,000 (US \$1,700 - US \$2,300).

Poor quality Sapphire 1 gram = N10,000 (US \$60).

The Mambilla blue sapphire comes in different grades and colours; red, orange, opaque and blue. The blue stones are the most sought after and very expensive. The Blue Sapphire from the Mambilla plateau are sold as

unprocessed precious stones and exported to mainly Thailand where the 'Blues' is used in making jewelry. Other uses of the sapphire include the manufacture of electronic chips and highly valued in India for its mystical potency. There are dealers at Gembu town or Nigerian and Senegalese buyers who hang around the pits to buy whatever is extracted. The marketing of the blue sapphire passes through many hands along the transaction chain.

Challenges of Blue Sapphire mining in the area

In 2007, the Nigerian government in realization of its abundant solid mineral resources and the contributions of artisanal and small scale mining launched the solid mineral development policy which is fundamentally on the minerals and mining Act of 2007. One the objective of the policy is to formalize artisanal and small scale mining operation (Ayodele, 2013). After seven years of this Act, the implementation is still stalled by some challenges. Miners in the area were not formally registered which agrees with the observations of Lawal (2002) and Murtala (2011) that over 95% of artisanal and small scale miners operate illegally. The findings of this study show that majority of the artisanal miners do not formal education, while only few have secondary school certificate. The mining operations are usually labour intensive and require low capital. This makes the operation attractive to the rural poor who cannot afford the cost of acquiring modern mining equipment. The finding of this study shows that getting the precious stone from the excavation has no certainty but a matter of chance. It requires consistency and determination. There is no guaranty of when one is likely to come across it while digging. Some get it on their first day of excavation while others spend weeks and even months without getting anything. However, those trading it are always making profit. The people continue to excavate the ground without limit until the come across the precious stone and when they don't find any, they abandoned the pit and move elsewhere. There is no back filling in the mining as no individual has the time for that. Essaghah *et al*, (2013) observed that artisanal and small scale mining operators lack the necessary capacity to initiate environmental protection measures or even social development project programmes. As a result of this, the environmental and social costs of their production activities are borne by the host communities. The depth could be up to 6 feet down. People come all the way from Cameroon, Chad, Niger and even Senegal Republics to the mine site.

Positive Impacts of the Sapphire mining in the area

1. Creation of large amount of wealth in the local communities. It is said that in a particular community they were able to buy 7 car Jeeps within a short time. The jobless youths use the money to build houses in their villages, buy motor vehicles and motor cycles and invest in other business ventures (build assets) and even marry from the proceeds of the mining.
2. It has raised the value of landed properties particularly rented houses as people move into the area in large numbers.
3. It provides gainful employment opportunity to thousands of youths who were hitherto idle youths but now absorbed in the lucrative business. The mining site is filled with mob of jobless youths who embarked on the feverish task of searching for the blue sapphire.
4. It enhanced trading in the area as there are more monies in people's pocket. So they can afford to buy whatever they wanted.
5. The discovery of the new blue sapphire mining in the area has made most jobless youths with subsistence lifestyle to flock to try their luck in the mining activity. Thus, providing alternative livelihood opportunity to many rural dwellers who were in the past trapped in the declining natural resources and land/farmland which causes conflicts in the area.
6. The mining has drastically reduced crime and robbery in the area as most youths now found legitimate alternative to making quick money in the area.
7. The informal economy that springs up in the communities around the mining area allows the economic value of sapphire to spread to other members of the communities especially service providers. The money generated creates opportunities to start new businesses. Much of the money generated by individuals were used for education of children and family members, start-up funds for small business.

Negative impacts of Sapphire mining in the area

- a. Migration of people from different parts of the state, country and outside the country into the area both as prospective miners and traders in the new business.
- b. The wealth generation from sapphire mining increases risky behavior and brings social hazards that erode the social capital of the communities around the mining site; increased demand for prostitution results in higher rates of HIV/AIDS transmission that destroys homes and community structure. The Mambilla plateau is an area of cold climate owing to its altitudinal location above 1500 m.a.s.l. The area is one of the places with the highest incidence of venereal diseases and HIV/AIDS in the state which was mainly caused by the climate and its location at the border with the Republic of Cameroon. The recent influx of people into the area will certainly increase the HIV/AIDS prevalence rate. This is

- because most of the people migrating into the area are mostly young male adults who travel without their wife and family and who now have enough money to pay for casual sex.
- c. It has led to increase in prostitution and sexual promiscuity in the area. The sudden wind of wealth in an area that is endemic to rural poverty is certainly bound to increase prostitution in the area. So many young girls go about in the area to hawk petty goods and their body in a bid to secure a living from the already deteriorating economic opportunity in the area.
 - d. Increasing school dropout in the area – the increasing wealth generation in the artisanal mining site is causing many schooling pupils/students to drop out of school in search money. The girls took to street hawking and petty trading while the boys search for paid jobs at the site such as digging holes, washing the excavated stones and gravels, sorting out of the precious stones among others.
 - e. Occupational hazards for diggers – the process of mining the blue sapphire is very difficult and involves high risk and occupational hazards which could result in death and injuries following collapse of mine pit and other accidents as the case may be.
 - f. Abandoned pits constitute hazard to cattle rearers as the pits could be deep enough for cows and sheep to fall inside.
 - g. When an area is exhausted, the valley lies in total ruin. Farmlands are loss along with crops and water course are silted. Good agricultural land is destroyed in the hunt of sapphire.
 - h. Severe windstorm are now been experienced in the area as a result of the clearing of forest vegetative cover which usually act as wind breaker.
 - i. Deforestation
 - j. Sedimentation and Siltation – during the process of sieving and washing gravel, large amounts of rocks, small pebbles and dirt enter river/streams and disrupt ecosystem.

The environmental degradation of artisanal mining on the Mambilla plateau stems from the tragedy of the commons behavior associated with the artisanal mining activity in the area.

Conclusion

This study has examined the process of artisanal mining of blue sapphire and the socio-economic impact of the mining on the Mambilla plateau. The study finding shows that the artisanal mining of the blue sapphire has created employment opportunity to the teaming jobless youths in the area. This has attracted many people from within and outside the country to the area. Although the mining of the sapphire has created wealth to the people, the negative impacts of the mining is also a major concern as large tract of forest cover and scarce agricultural are lost in the area in the process of sapphire hunt. It is therefore pertinent to introduce sustainable measure in the process of the mining activity to reduce its impacts on the environment. This study therefore recommend for the following;

1. The government should put in place framework that integrates the artisanal miners fully into the productive sector of the national economy and.
2. There is need for advocacy campaign to enlighten artisanal miners on the direct link between their operations and environmental degradation.

Reference

- Ayodele, O.S., Akongwale, S. and Nnadozie, U.P. (2013). Economic Diversification in Nigeria: Any Role for Solid Mineral Development. *Mediterranean Journal of Social Sciences*. Vol. 4. No. 6. Pp. 691–703.
- Essaghah, A., Ogbonna, C. and Alabi M.O. (2013). Environmental and Socioeconomic Impacts of Lead and Zinc Ores Mining in Shaiagu Community of Ebonyi State, Nigeria. *Journal of Geography and Earth Science*. Vol. 1. No.1. pp. 30-38.
- Frantz, C. (1981). Development without Communities: Social Fields, Networks and Action in the Mambilla Grasslands of Nigeria. *Human Organization*, 40, pp. 211-220.
- Jeje, L.K. (1983). “Aspects of Geomorphology of Nigeria”. In Oguntoyinbo, J.A.S. *Geography of Nigerian Development*. Second Edition. Heinemann Educational Books (Nig.) Limited.
- Kanis, J. and R. R. Harding (1990). "Gemstone prospects in central Nigeria". *Journal of Gemmology* Vol. 22 (No. 4): pp. 195–202.
- Kiefert, L. and K. Schmetzer (1987). "Blue and yellow sapphire from Kaduna Province, Nigeria". *Journal of Gemmology* Vol. 20(No. 7/8): pp. 427–442.
- Korndoerfer, T. L. (2009). Sustainable Livelihood: A case Study of the natural resource use in Yelwa village, Nigeria. A thesis submitted in partial fulfillment of the requirements for the Degree of Master of Environmental Science at the University of Canterbury
- Lawal, M. (2002). Constraints to Small Scale Mining in Nigeria: Policies and Strategies for Development. Centre for Energy Petroleum Mineral Law and Policy. Annual Review – The Dundee Year book of International

National Resources and Energy Law and Policy.

Michelou, J. C. (2007). "Le Nigeria. Source de pierres de couleur." *Revue de Gemmologie AFG* (No. 159): pp. 30 - 41.

Mould, A.W.S (1960). "Report on a Rapid Reconnaissance Soil Survey of the Mambilla Plateau", Bulletin No. 15, Soil Survey Section, Regional Research Station, Ministry of Agriculture, Samaru, Zaria.

Mubi, A.M. and Tukur, A. L. (2005). "Geology and Relief". In Tukur, A.L., Adebayo, A.A. and Galtima, A. (Eds.). *The Land and People of the Mambilla Plateau*. Heinemann Educational Books. Nigeria. Pp. 16-24.

Murtala, C. (2011). An Extensive Analysis of Mining in Nigeria Using a GLS. *Canadian Center of Science and Education*. Vol. 3. No. 1. pp. 3-12.

Pardieu, V., Sangsawong, S., Muyal, J. and Sturman, N. (2014). Blue Sapphires from the Mambilla Plateau, Taraba State, Nigeria. A Preliminary Examination. *GIA News From Research*.

Raw Material Research and Development Council (2010). "Non-metallic Mineral Endowment in Nigeria". From http://www.rmrdc.gov.ng/resources/pdf/newsletter/non_metallic_raw_materials.pdf.

Tukur, A.L., Adebayo, A.A. and Galtima, A.(Eds.). (2005). *The Land and People of the Mambilla Plateau*. Heinemann Educational Books. Nigeria.

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Emeka Daniel Oruonye is a lecturer in the Department of Geography, Taraba State University Jalingo. His research interests span through development geography, agriculture and rural geography, local geography and environmental problems. He is a member of many professional bodies including the Association of Nigerian Geographers (ANG), Association of American Geographers (AAG) and African Forest Forum (AFF).



Fig. 1. Sample of extracted blue sapphire

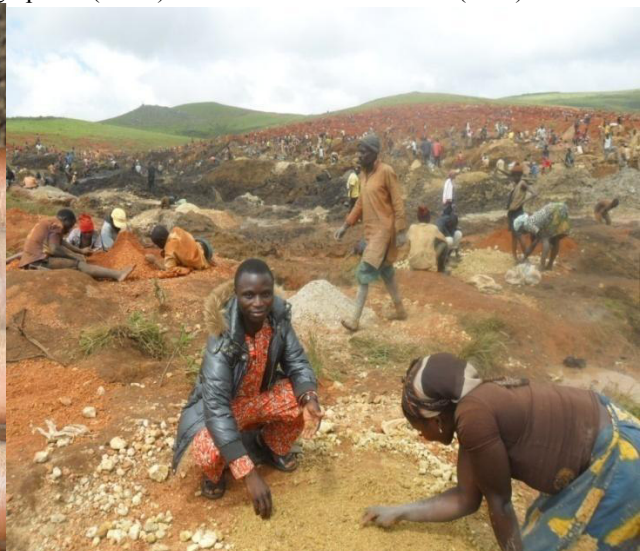


Fig. 2. Sorting out of sapphire from gravels



Fig. 3. Approaching the new mining.



Fig. 4. Beehive of activities at the mining site.

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