

Assessing the Environmental Implications of Alluvial Gold Mining Activities in Ijesha Land, Nigeria

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Abstract — “Rewashing” as it is commonly called involves the process of scooping out and washing chunks of mud from a closed alluvial gold mine site with the purpose of extracting any leftover gold deposits in the site. It is usually carried out by illegal miners who infiltrate closed mine sites with the goal of scavenging for any leftover gold deposit. This paper examines the process of “rewashing” in a mining community in Nigeria. It then discusses the looming danger it portends for the environment. Lessons from the study was used to justify the need for an efficient regulation of the industry as well as effective formalisation drive that captures the interest of legitimate artisanal miners who take succour in these activities for survival.

Keywords — Environmental sustainability, formalisation, illegal mining, reclamation.

I. INTRODUCTION

The opaque extraction of mineral resource, mostly by foreign nationals, occasioned by regulatory gaps, usually leaves environmental challenges for residents to cater to [1]. In Nigeria, one of these challenges emanates from the improper closure of surface gold mine sites. These abandoned sites usually attract the activities of illegal miners who infiltrate the sites to scavenge for possible left over gold deposits. The case in point is a mining community in Southwestern Nigeria where there are several unreclaimed alluvial gold mine sites left by foreign nationals. These sites are now being overtaken by a group of local illegal miners popularly called *Rewashers*.

Alluvial gold is deposited by water movement. This contrasts with primary gold which is Reef or Lode gold where the gold is still deposited in its original host rock. Alluvial mining generally involves the mining of stream bed deposits. It is usually done through open-pit mining or the use of various surface extraction equipment. When a river runs through a terrain that is rich in gold, alluvial gold deposits begin to form over time in such areas.

The erosive power of the running river removes the rock surrounding the gold due to their lower comparative density thereby leaving the gold as sediments along the riverbed. These alluvial gold deposits then take the form of dust, thin flakes or nuggets [2].

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It is widely known that mineral extraction results in safety, health and environmental challenges. In the case of alluvial gold mining, the most predominant impacts include contamination of water bodies, destruction of natural habitat, pollution of the soil and land, displacement of communities, and endangering of the health of community dwellers and workers [3], [4], [5].

The negative impacts of gold mining activities have been discussed extensively in the literature with most studies focusing on the use of mercury which is commonly used in processing the gold ore [6]. In alluvial gold mining, the major impacts identified include deforestation, pollution and flooding. Specifically, studies have argued that the deforestation, caused by these operations, is one of the major contributors to climate change [7]. However, most of the existing studies that examines the impacts of illegal mining operations on the environment in Nigeria are quantitative in nature [8], [6]. The purpose of this paper is to explore the rewashing operations carried out in this study area with a focus on its potential environmental implications using a qualitative approach.

This paper uses the prevailing rewashing operations in the study area to discuss the potential environmental impact of alluvial gold mining. This study adopts a qualitative observatory approach which involves the process of gathering data for research through subjective methods. The research was undertaken at four abandoned mine sites each hosting up to three groups of Rewashers. The study area is at Ijesha land in Osun state, Nigeria. Ijesha land was chosen purposively for this study because it hosts vast deposits of gold which are being targeted by illegal mining operators [9]. A series of discussions were carried out with the group of miners engaged in the operations. These discussions enabled the researcher to identify the entire processes involved in the operations and the potential environmental implications of each phase of the operations. The close contact with the mine operators also enabled the researcher to observe the environment where these operations are carried out and to physically assess the level of compliance to safety, health and environmental standards.

II. REWASHING FOR GOLD IN IJESHA LAND

Ijesha land in the Southwestern region of Nigeria hosts abundant placer gold deposits. Over the years, the communities within this area have attracted investors in the gold mining industry including foreign miners (mostly Chinese) who carry out mining activities on a medium to large scale basis. The industry has also attracted sizable small-scale miners and some illegal miners too. While these operations have benefitted several mine workers in the

community with direct job opportunities and some indirect ones like drivers and marketers who work within and around the mine sites, it has not led to a significant increase in the state's revenue which could create a general improvement in the wellbeing of the indigenes [10]. This, among other factors has led to the rise of activities commonly referred to *rewashing*. This involves the process whereby illegal miners infiltrate closed or abandoned mine sites to extract chunks of mud with the purpose of extracting any leftover gold deposits in the site. These miners employ a crude form of gravity processing technique whereby the excavated mud is poured over a local version of a sluice table which has a rug placed on it to act as a form of trapping mechanism. Water is then hauled over the mud to wash away all the particles while leaving the dust of gold as sediments which is now trapped in the rug. The rug is then washed in a pan of water. The gold is separated from the other particles through a slow panning process. Since the gold dust has a higher specific gravity than the other particles, it settles at the base of the panning dish as other particles are gradually washed off (see, fig 1. A to D).



Fig. 1. Rewashing process

The right to gainful employment and a source of livelihood is one enshrined in the Sustainable Development Goals (SDG) goal 8 which promotes productive employment and decent work for all [11]. While rewashing may not be regarded as a "decent work" owing to its encumbrances, still, miners in the industry are able to provide for their families which reduces the level of hunger in the land, the rate of unemployment, and by extension, the rate of crime in the society. It must be said however that these benefits are not without a cost to health, safety and the environment. Some of these environmental concerns will be discussed in the next section.

III. ENVIRONMENTAL IMPLICATIONS OF THE REWASHING OPERATIONS

The adoption of mercury, commonly used by artisanal and small-scale gold miners for amalgamation of gold as discussed in the literature, was not noticeable during the visit to the mine sites. However, the physical observatory method engaged in the study allowed for the identification of other environmental concerns attributable to the mining operations. These are discussed under each operation carried out by the miners as stated below.

3.1 Excavation of mud and slurry

As the miners dig out the muds, they leave pockets of excavated sections within the site which are not linked to any drainage channel or canal (see fig. 2). As rain falls, these sections become filled with water which may spill to neighbouring farms or settlement and cause contamination of the immediate environment. In addition to the environmental implications of this operation, there are observed health and safety dimensions as well. During the site visit by the researcher, it was easily noticeable that the miners were not wearing any protective equipment which could prevent them from being harmed by any sharp objects in the pool of mine water or any other flying objects.



Fig. 2: Stagnant wastewater from Rewashing operation in Ijjesha land

3.2 Sluicing

The sluicing operations rely on hauling water which is being scooped from the mine wastewater. The water hauled over the mud to wash off the particles flows back into the same wastewater. This releases sediments into the wastewater which can flow into nearby rivers. This may cause high turbidity which poses danger to aquatic life by reducing sunlight penetration, clogging the gill of fishes and disrupting the habitats of sensitive species.

3.3 Washing

The rug or carpet used to trap the heavy sediments during sluicing is washed in a pan to recover the gold deposit. This process may potentially release heavy metals naturally found in the soil such as arsenic, lead or cadmium into the nearby water bodies. Since the local communities that are nearby these mine sites still rely on rivers for domestic water use, then there is a risk of poisoning from these rivers which poses danger to the health of community residents.

3.4 Panning

The final phase of the operation which involves the use of a slow panning process to separate the remaining sediments through gravity technique, has its own potential risks. As the gold settles at the base of the pan, the other sediments are washed off into the mine wastewater and to the riverbeds. This also pose some danger to aquatic habitat and the nearby communities which rely on these rivers.

IV. POTENTIAL ENVIRONMENTAL IMPACTS

The following are some potential impacts to the environment that may arise from activities of the Rewashers in the study area.

4.1 Freshwater Ecotoxicity

Evidently, the foreign operators who formerly managed the mine sites usually leave the sites unrestored but they do channel the mine wastewater using an excavator which links the water to the nearest drainage away from the mine area. However, Rewashers give little regard to the flow of mine wastewater. A previous study by [9] in the same study area linked various health challenges of residents of these communities to mining activities. Some attributed ailments include typhoid, cholera, and skin leach which are common diseases in the mining communities.

4.1 Deforestation

Deforestation is the intentional removal of trees and forests to make way for other uses. As the operations involve clearing of trees, plants and other vegetation to access the soil and sediment layers, the activities may lead to reduced biodiversity and further risk of erosion.

4.2 Potential flooding

The alluvial operations disrupt the natural ecosystems and water management systems. Thus, it can significantly heighten the chances of flooding in affected areas. As shown in fig. 2, the excavation by the Rewashers blocks the natural drainage, which alters the water flow. This alteration can lead to the accumulation of water in certain areas, creating localized flooding. Similarly, the disposal of mining tailings and other waste materials can obstruct waterways, impeding flow and contributing to flooding upstream.

V. CONCLUSION

This study examines the activities of illegal gold miners commonly called Rewashers in mining communities in Ijesha land, Nigeria. The study adopts a qualitative observatory approach. The paper specifically identified operations by these miners which poses danger to the environment. Thus, the study corroborates other previous quantitative studies that have been conducted in the study area by providing a better understanding of the activities of the miners leading to potential hazardous consequences on the environment and the nearby settlements. The study recommends stringent policies that enforces proper closure of alluvial gold mines sites. Additionally, it is recommended that artisanal and small-scale gold miners are provided with designated mine spaces which will prevent them from operating in locations where there may be severe negative impact on the environment.

The study noted that even though the activities of rewashers have negative tendencies, the local miners have the basic skills for extraction and processing of alluvial goal.

Thus, to harness the economic benefits of this occupation, it is recommended that these informal mining operations be formalised. This formalisation drive must involve a conscious effort by the government ministry of mines to provide support for decent mining. To achieve this, the local informal miners should be trained on safe mining practices and equipped with modern mining tools. The miners should also be provided with the required operational licenses to exist in the formal domain in accordance with recent arguments in the study of artisanal and small-scale mining in sub-Saharan Africa [12], [13], [14].

REFERENCES

- [1] Onuoha, F., & Ojewale, O. (2023). *Mining and extractives / Illegal mining by Chinese actors complicates Nigeria's criminal landscape*. ENACT. <https://enactafrica.org/enact-observer/illegal-mining-by-chinese-actors-complicates-nigeria-s-criminal-landscape>
- [2] CDE. (2024). *Alluvial Gold Mining*. CDE GROUP. <https://www.cdegroupp.com/applications/other-applications/mining-mineral-ores/alluvial-gold-mining#:~:text=Alluvial gold usually takes the,dust%2C thin flakes or nuggets.&text=The first stage in alluvial,larger mineral and rock fraction>
- [3] Earthworks. (2024). *Environmental Impacts of Gold Mining*. Info@earthworks.Com. <https://earthworks.org/issues/environmental-impacts-of-gold-mining/>
- [4] Fonshiyinwa, M. M., Fuanya, C., Hoth, N., Ouabo, R. E., Tangko, E. T., Günther, J., Eseye, M. E., & Drebenstedt, C. (2024). Environmental impacts of artisanal and small - scale gold mining within Kambele and Pater gold mining sites , East Cameroon. *GeoJournal*, 89(3), 1–23. <https://doi.org/10.1007/s10708-024-11093-8>
- [5] Mensah, A. K., Xavier, F., & Tuokuu, D. (2023). *Polluting our rivers in search of gold: how sustainable are reforms to stop informal miners from returning to mining sites in Ghana? May*, 1–17. <https://doi.org/10.3389/fenvs.2023.1154091>
- [6] Environmental Law Institute. (2014). *Artisanal and Small-Scale Gold Mining in Nigeria: Recommendations to Address Mercury and Lead Exposure* Copyright (Issue November). <https://www.eli.org/sites/default/files/eli-pubs/nigeria-asgm-assessment-final-report.pdf>
- [7] Asare, D., Ansong, M., Asante, W. A. & Kyereh, B. (2024). Impact of different illegal artisanal and small-scale mining techniques on soil properties in major mining landscape in Ghana. *Environmental Challenges* 17(2024) 101008 <https://doi.org/10.1016/j.envc.2024.101008>
- [8] Clement, A., & Olaniyan, O. (2016). Environmental Assessment of Lead Contaminated Site from Artisanal Gold Mining in Bagega Community, Nigeria. *Archives of Current Research International*, 5(4), 1–9. <https://doi.org/10.9734/acri/2016/29551>
- [9] Adeoye, N. O. (2015). Land degradation in gold mining communities of Ijesaland , Osun state , Nigeria. *GeoJournal*. <https://doi.org/10.1007/s10708-015-9630-x>
- [10] Oniyide, G., & Salako, O. (2008). Assessment of Contribution of Ilesha Gold Mining to Employment Creation and Revenue Generation in Osun State. *Annual National Conference of Nigerian Institution of Metallurgy, Mining and Materials Engineers*.
- [11] Eniowo, O. D. (2024). Exploring the risk factors to formal financing for artisanal and small-scale mining operations. *Social Impacts*, 3(100043). <https://doi.org/10.1016/j.socimp.2024.100043>
- [12] Eniowo, O. D., Kilambo, S. R., & Meyer, L. D. (2022). Risk factors limiting access to formal financing : Perceptions from artisanal and small-scale mining (ASM) operators in Nigeria. *The Extractive Industries and Society*, 12(November), 101181. <https://doi.org/10.1016/j.exis.2022.101181>
- [13] Eniowo, O. D., Meyer, L. D., Kilambo, S. R., & Gerber, L. J. (2022). Implications of credit constraint on the formalization of artisanal and small-scale mining (ASM) in sub- Saharan Africa. *The Journal of the Southern African Institute of Mining and Metallurgy*, 122(03), 97–106. <https://doi.org/10.17159/2411-9717/1665/2022>

- [14] Hilson, G., Hilson, A., Maconachie, R., McQuilken, J., & Goumandakoye, H. (2017). Artisanal and small-scale mining (ASM) in sub-Saharan Africa: Re-conceptualizing formalization and 'illegal' activity. *Geoforum*, 83(May), 80–90.
<https://doi.org/10.1016/j.geoforum.2017.05.004>