A RESEARCH PROPOSAL

ON

INFLUENCE OF MINING ACTIVITIES ON PHYSIOCHEMICAL PROPERTIES OF SOIL AT IFEWARA GOLD MINE SITE DURING DRY SEASON, OSUN STATE, NIGERIA.

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1.0INTRODUCTION

Soil is one of the most important resources of the nature, all living thing depends on plants and plants grow in soil for day to day need. All agricultural production and development of forest depends upon physico-chemical parameters of the soil used for it, soils are medium in which crop grow to food and cloth. Soil is not only important for agriculture but also have more useful for living organisms. Soil as components of the terrestrial ecosystem fulfills many functions including those that are essential for sustaining plant growth (Nwachokor, *et al.*, 2009). The importance of soil as a reservoir of nutrients and moisture for the production of forage and plant species, has been recognized since the beginning of the forest management as a management as a science (Schlesinger, *et al.*, 1990).

Soil formation is a constructive as we as destructive process (Pujar, *et al.*, 2012), soil is composed of particles of broken rock that have been altered by chemical and mechanical processes that weathering and erosion. Soil has a complex function which is beneficial to human and other living organism (Sumithra, *et al.*, 2013). Soil is not merely a group of mineral particles; it has also a biological system of living organisms as well as some other components, the climate and other factor largely affect the soil formation.

All agricultural productions and development of forest depends upon physic-chemical parameters of the soil used for its straight off a day's need at soil testing is increased due to interest of the public in the caliber of products obtained from it and different practices carried for their output. The soil quality analysis include an analysts of parameters and process which effects on soil to operate efficiently as a component of a

sound ecosystem (Ku Smita and Sangita, 2015).

1.1Role of Physico-chemical properties in soil quality

1.1.1pH

pH is a most important physical properties of soil, it having great effects on solute concentration and absorption in soil (Akpoveta, *et al.*, 2010), soil pH is an important consideration for farmers and gardeners for several reasons, including the fact that many plants and soil life forms prefer either alkaline or acidic condition (Pandeeswari and Kalararasu, 2012). The pH is considered while analyzing any kind of soil if the pH is less than 6 then it is said to be an acidic soil, the pH range from 6 – 8.5 it's a normal soul and greater than 8.5 then it is said to be alkaline soil.

1.1.2Texture

Soil texture is a qualitative classification tool used in both the field and laboratory to determine the classes for agricultural soils based on their physical texture, soil having different textural group on basis of the proportion of different sized particles, soil texture directly influences soil – water relation aeration and root penetration. It also affect on the nutritional status of soil. Soil texture can be expressed significantly by its electrical conductivity. Clay textured is highly conductive while sandy soil are poor conductors. Texture of most of the soil was loamy and clay of yellow soil.

1.1.3Moisture

Water content or moisture content is the quality of water contained in a material, such as soil called soil moisture; moisture is a most important physical property of soil. The absorption of nutrients is depends on the moisture of the soil. The water content of soil as also much related to its texture and structure. The soil moisture commonly depends on void ratio, particles size, clay mineral, organic matter and ground water condition.

1.1.4Soil Temperature

Temperature of the soil is an important property because it influences the chemical, physical and biological processes associated with plant growth. Soil temperature fluctuates with season, time of the day and local climate condition. The major source of heat is sun and heat generated by the chemical and biological activity of the soil and soil has a temperature range between 20°C and 60°C.

1.1.5Electrical Conductivity

Electrical conductivity is also a very important property of the soil, it is used to check the quality of the soil, it is a measure of ions present in solution (Ku Smita and Sangita, 2015). Electrical conductivity varies with depth and its range of variation was less in upland profile probably occurred due to slope of land surface, high permeability and high rainfall, responsible to leach out alkali and alkaline bases.

1.1.6Nitrogen

Nitrogen is the most critical element obtained by plants from the soil and is a bottleneck in plant growth. Nitrogen is a most important fertilizer element, plants respond quickly to application of nitrogen salts. This element encourages above ground vegetation growth and gives a deep green colour to the leaves, plant root take up nitrogen in the form of NO_3 and NH_4 (Sumithras, *et al.*, 2013).

1.1.7Phosphorus

Phosphorus is a most important element present in every living cell (Ku Smitha and Sangita, 2015), it is one of the most important micronutrient essential for plant growth phosphorus most often limits nutrients remains present in plant nuclei and act as energy storage.

1.1.8Soil Organic Matter

It is also valuable property of soil, if the soil is poor in organic matter, then it enhance the process of soil erosion (Ku Smitha and Sangita, 2015). If the soil organic matter is present in soil, then this soil is useful for the agricultural practices, organic matter maybe added in the soil in the form of animal manures, compost etc.

2.0AIM AND OBJECTIVE OF THE RESEARCH WORK

2.1.1Aim of the Research

The aim of this project is to investigate on the Influence of Mining Activities on physiochemical properties of soil at Ifewara gold mine site during dry season, Osun State, Nigeria.

2.1.2Objectives of the Study

The main objectives of the study are to:

i.determine the physical and chemical parameters such as, soil pH and temperature, Electric Conductivity (EC), Total Dissolved Salt (TDS), chlorine ion, sulphide ion and nitrite ion, Mg^{2+}, Na^{2+}, K^{+}, Ca^{2+},. Also, some heavy metals contaminants such as Cobalt (Co), Cadmium (Cd), Zinc (Zn), Cr (Chromium) and Lead (Pb).

ii.ascertain the effect of mining activities of Ifewara gold mine site, Osun State on the soil quality.

3.0SCOPE OF THE RESEARCH WORK

The study of soil sample will be collected from the mining site and adjourning undisturbed area. They physiochemical properties of the sample collected will be analyzed using standard procedures and the results will be compared with World Health Organization (WHO) and understand threshold limit.

4.0STATEMENT OF PROBLEM

The Influence of mining activities on soil properties can damage the soils on which crops are grown and also the environmental contamination of soil can pose a significant threat to human health and aquatic life.

5.0JUSTIFICATION

The results of this study will be recommended to the Government's Ministry of Environment at all levels to adopt a good management approach to the incessant and inadequate mining activities going on in the study location.

6.0LITERATURE REVIEW

The Chemical properties of soils include the following aspects: Inorganic matters of soil, Organic matters in soil, Colloidal properties of soil particles and Soil reactions and Buffering action Acidic soils and Basic soils. Soil is a natural resource comprised of solid minerals and organic matter, liquids and gasses that occur on the surface. Soil provides habitats for organisms and moisture and nutrients for the basic requirements of plant growth. Soil is the basis of the production in agriculture and forestry. Soil is an important component of the human environment and is a significant component of terrestrial ecosystems. Soils are characterized by physical, chemical and biological properties.

2.1.2Artisanal Mining Activities

Artisanal mining is generally a small-scale practice where the basic tools and manual labor are generally used for excavation (Canavesio, 2014). Artisanal mining activities are also an informal procedure, which though have found to cause severe environmental disruptions, have also been linked with economic benefits (including employment opportunities, tourism, technology advancements, and accessibility to both native and migrant populations) Canavesio, (2014). The informal mining activities are characterized by low productivity, a lack of capital, poor technology, hazardous working conditions, land degradation, and pollution (Emel, Huber, and Makene, 2011).

Artisanal mining practices are common in Africa, and many researchers have investigated their attributes. For example, Hilson (2001) provides information about the workings of the small-scale mining industry in the Ghana, and argued that initiatives have recently been taken to regularize and formalize the activities of the industry, with the intention of reducing the associated environmental impacts and land-use conflicts. Except for the recent efforts by the Ministry of Mine and Steel Development, gold mining in Nigeria is largely uncontrolled, and the majority of the operators are unlicensed Oramah *et al.*, (2015). Studies have indicated mine sites are around farmlands where chemicals may accumulate in fruits and leaves of arable and cash crops, and that soil contamination in mine sites can cause severe heavy metal contamination of water sources and poisoning of humans and animals, if ingested (Bartrem *et al.*, (2014); Lo *et al.*, (2012); Oramah *et al.*, (2015); Plumlee *et al.*, (2013). Poisoning by materials

associated with mining has been associated with increased cases of kidney pain, respiratory problems, dizziness, and miscarriages in women, and deaths in many residents of communities where mining activities are carried out (Twerefou *el al.*, 2015).

7.0 RESEARCH METHODOLOGY

The methods that will be used for this research work will be field work and laboratory work.

7.1 Field Work

Soil sample will be collected from the mining site and adjoining undisturbed areas and the physicochemical of the sample will be analyzed using standard procedures and the result will be compared with the World Health Organization (WHO) and other standard threshold limit.

7.2 LABORATORY WHERE TESTS ARE TO BE CARRIED OUT

Sample collection: sediment samples were randomly collected from different locations covering Ifewara mining environments in South West, Nigeria. Samples will be collected with stainless steel trowel; stones and plant debris will be discarded. In order to have a homogeneous representative sample of the sediment, about 3 sub samples will be collected from each sampling site. The subsamples collected will be homogenized from where a representative sample was finally taken and kept in a sample cloth particularly sown for the purpose. The sediment samples will be air dried for 2 to 3 days, sieved to remove large grains, properly grinded in an agate mortar and kept in labelled bags for analysis. From each sample 13 mm diameter and 1 mm thick pellets will be made with Spec-caps by applying 10 Ton pressure with hydraulic pelletizing machine. Pellets made will be used for the XRF analysis to determine the total concentration of heavy metals in the samples.

8.0WORK PLAN

The project schedule would covers a period of six (6) month comprising literature

review, data collection, data analysis, final write up and submission, as presented in Table 1.

Table 1: Research Work Plan

S/N	TIME/MONTH	Schedule/Research Work	Status/ Remarks	Cost
1.	1	Literature Review	On-going	₦10,000.00
2.	1	Field Work/Data Collection	January, 2025	₦90,000.00
3.	1	Laboratory Test	January, 2025	₦70,000.00
4.	1	Data Analysis	April, 2025	₦20,000.00
5.	1	Final Thesis (Write up)	May, 2025	₦20,000.00
6.	1	Final Presentation	June, 2025	₦10,000.00
Total	**6 months**			**₦320,000.00**

9.0SOURCE OF FUND

The research will be self-sponsored and the budget for the research will be three hundred and twenty thousand (₦320, 000.00) naira only as presented in Table 1.

10.0 REPORT WRITING

The technical report of the research work will be written.

11.0CONCLUSION

This study will revealed the mining activities going on in Ifewara in Osun State Nigeria having either negative of positive impact on the soil by evaluating the heavy metals that are above the threshold limit and investigating the soil's physicochemical parameters that causing the pollution of the soil, these heavy metals in plants and the associated health problems of the mining activities to the inhabitants of the studied location.

12.0 SUPERVISOR

The project will be carried out under the supervision of Engr. Agbalajobi, S.A.

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