

**African Network for Studies on Climate Resilience and Energy
Sustainability
(ANCRES)**

**RESEARCH TOPIC, ABSTRACTS AND CONTACT PERSONS FOR RECOMENDATION AT HOST
INSTITUTION**

Master's Degree Seeking (24 Months)			
HEIS	TOPIC	ABSTRACT	PREREQUISITE
UNIVERSITY of BUEA Contact Person Dr Bokanda Ekoko Eric eric_ekoko@yahoo.com ericekoko88@gmail.com	<i>Environmental impact and ecological risk of micro plastic pollution on agricultural soils in Fako, South West Region, Cameroon: Case study Tiko agro-industrial zone</i>	Plastic pollution has emerged as a critical environmental problem across the globe, with substantial adverse effects on terrestrial ecosystems, agricultural productivity, and human health. In agricultural landscapes, the use of plastic mulch, packaging waste, and irrigation tubing contributes to plastic residues in soils, including microplastics (<5 mm) and macroplastics (>5 mm). In many urban-rural fringe areas of Cameroon including the Tiko agro-industrial zone, rapid population growth, limited waste management infrastructure, and increased reliance on plastic products have accelerated soil contamination. Soil serves as a reservoir of nutrients essential for plant growth. When plastic fragments accumulate, they alter soil structure, porosity, water retention, and microbial communities, leading to potential declines in productivity. Emerging evidence shows that microplastics can adsorb toxic chemicals and heavy metals, mobilize in plant tissues, and enter food chains. Plastic materials have become an integral component of modern society due to their durability, low cost, and versatility. Since the mid-20th century, global plastic production has increased dramatically, leading to widespread environmental contamination in terrestrial and aquatic ecosystems. Agricultural soils are increasingly recognized as major reservoirs of plastic waste and microplastics resulting from agricultural practices and improper waste management. Despite robust research in coastal and aquatic environments, assessment of plastic impacts in terrestrial agricultural systems, especially within Cameroon is limited and warrants targeted study.	BSc in Geology/ Earth Science/ Geosciences Language of instruction English. BSc GPA ≥2.6/4 ≥3.3/5
	<i>Assessment of Heavy Metal Contamination in Soils, Water, and Food Crops within Tiko agro-industrial zone, South West Cameroon: Sources, Distribution, and Human Health Risk Implications</i>	Heavy metal contamination has become a major environmental issue in agricultural regions worldwide. In plantation systems such as those in Tiko agro-industrial zone, intensive farming practices involving fertilizers, herbicides, and fungicides contribute significantly to the accumulation of toxic metals in soils and water bodies. These contaminants may be transferred into crops and eventually enter the human food chain. Tiko plantation, located in the South West Region of Cameroon, is a major agro-industrial hub characterized by banana, rubber, and oil palm cultivation. Continuous agricultural activities, combined with industrial operations and transportation emissions, make the area vulnerable to heavy metal pollution. Despite its economic importance, there is limited comprehensive data on contamination levels and associated health risks in this region. The increasing use of agrochemicals and industrial inputs in Tiko plantation may lead to the accumulation of heavy metals such as cadmium (Cd), lead (Pb), copper (Cu), and zinc (Zn) in soils and water systems. These metals can persist in the environment, accumulate in crops, and pose serious health risks to local communities.	
UNIVERSITY OF PORTHACOURT	Environmental Studies Research aim is to identify, remediate and	Geophysical tools and techniques play a crucial role in monitoring and assessing soil contamination, which can have	BSc in Geology/ Earth Science/ Geosciences

<p>Contact Persons Prof. Ndukauba Egesi ndukauba.egesi@uniport.edu.ng ndukaegesi2019@gmail.com</p>	<p>restore hydrocarbon contaminated lands and water environments in parts of Niger Delta</p>	<p>significant impacts on land and water environments. The tools identify soil properties and contamination levels, aiding in the management and remediation of contaminated areas. Examples are: Electrical Resistivity Tomography ERT: This method sometimes called Electrical Resistivity Imaging ERI measures the resistivity distribution of sub-surface materials, which can help identify variations in lithology, fluid content, and porosity. It particularly effective in groundwater exploration and environmental studies where understanding the distribution of these properties is crucial for effective resource management. Seismic Refraction: This method measures the velocity of seismic waves as they travel through different subsurface layers, providing information about geologic structures and potential aquifer zones. It is valuable for assessing groundwater potential and environmental conditions. Ground Penetrating Radar (GPR): GPR uses radar signals to penetrate the ground and create a subsurface image, which can be used to assess soil properties and contamination levels. It is particularly useful for detecting buried objects and understanding soil conditions. Induced Polarization IP: This technique measures the response of soil to electric fields, providing information about soil moisture content and contamination levels. It is used in conjunction with other geophysical methods to enhance the accuracy of contamination assessments. Geochemical Monitoring: In some cases, geophysical methods are combined with geochemical techniques to monitor the effects of soil contaminants on land and water environments. This approach provides a comprehensive understanding of the sub-surface conditions and inform effective and engineering practices are made. In Ogoniland Nigeria, where United Nations Environment Program UNEP 2011 report, identified contamination of soil and water environments through random sampling. The integration of geophysical methods in site characterization case studies by researchers, reveals several critical insights into subsurface conditions across diverse environments.</p>	<p>Language of instruction English. BSc, MSc CGPA 3.0/5 or its equivalent</p>
	<p>Critical and Battery Minerals Research in coastal sands and Basement Complex rocks of Southeast Nigeria</p>	<p>Critical minerals such as lithium, cobalt, nickel, copper and rare earth elements REEs are essential for Renewable Energy technologies powering everything from electric vehicles EVs and batteries to wind turbines and solar panels. There are 17 rare earth elements REEs, 15 in the chemical group called lanthanides, as well as yttrium and scandium which moderately abundant in the Earth's crust. Their rareness comes from the fact that they are not concentrated enough to be easily exploitable</p>	<p>BSc in Geology/ Earth Science/ Geosciences Language of instruction English. BSc CGPA 3.0/5 or its equivalent</p>

		<p>economically. China has been exceptionally far-sighted in its rare earth element REE strategy. Indeed, China identified the potential for rare earth sector in the 1960s, envisaging REEs as “the oil of the twenty-first century”. Critical minerals are the backbone of Renewable Energy technologies, enabling the electrification of transport expansion of solar and wind power, and energy storage solutions. Their responsible management through sustainable mining, recycling and international cooperation is essential to achieve a low-carbon, equitable, and resilient energy transition. Clean energy technologies from wind turbines and solar panels to electric vehicles and battery storage require a wide range of metals. The type and volume of mineral needs vary widely across the spectrum of clean energy technologies, and even within a certain technology. Their exploration will be at the coastal sediments in Nger Delta and Basement Complex rocks in Southeast, Nigeria.</p>	
<p>UNIVERSITY OF SCIENCE AND TECHNOLOGY MASUKU</p> <p>Contact Person</p> <p>Dr MABICKA OBAME Rolf Gael</p> <p>rolfgaelmabickaobame@gmail.com</p> <p>rolfmabicka@gmail.com</p>	<p>Influence of chicken manure on the physicochemical properties, carbon stocks, and greenhouse gas emissions of ferralitic soils</p>	<p>In tropical countries soils are highly weathered with low organic matter and nutrient retention capacity. Due to high rainfall, most of the mineral elements are leached away reducing soil fertility which affects crop production. Chemical fertilizers have been recognised as the most important contributor to the increase in world agricultural productivity over the past decades (Bilong et al., 2022). Therefore, the use of chemical fertilizers can be suitable for improving crop yield; but because of their high cost and scarcity the use of chemical fertilizers is very limited by smallholder farmers. Moreover, the negative effects of chemical fertilizer on the soil and environment limit its usage in sustainable agricultural system. In such a context of farmers’ inability to purchase mineral fertilizers, local organic resources remain the main source of nutrients for soil fertility management and agricultural production. Organic manures have been recommended as alternative to mineral fertilizers for improving soil productivity in agricultural systems in Africa because of their beneficial effects on soil productivity (Harraq et al., 2021; Ravindran et al., 2017; Adekiya and Agbede, 2016). In several countries, intensive poultry production systems generate large volumes of manure which is deposited on the soil and causes enormous pollution concerns, due to the substances they produce, contaminating the soil, water, and air. It is the most valuable of all animal manures an excellent source of organic fertilizer because it contains a high percentage of nitrogen (N), phosphorus (P), potassium (K), magnesium (Mg) and other important nutrients readily available for plant uptake when compared to other organic sources (Kobierski et al., 2017; Casas and Guerra, 2020; Pangaribuan et al., 2020; Schmidt and Knoblauch, 2020; Ismael et al., 2021). The objective of this study is to evaluate the effect of chicken manure on the physico-chemical properties of ferralitic soils and their capacity to sequester greenhouse gases.</p>	<p>Soil Science, Agronomy or Environmental Science</p> <p>Language of instruction French.</p> <p>BSc GPA /4 .../5</p> <p>NB: proposal should be written in French</p>
	<p><i>Evaluation of the quality and carbon sequestration capacity of sandy soils on the Bateke plateau</i></p>	<p>Sandy soils, mostly Arenosols, located beneath tropical native savannas, span over 6 million hectares from Central Africa, over the Democratic Republic of the Congo (DRC) and Gabon to the Republic of the Congo (RoC) (Schwartz and Namri, 2002; Jones et al., 2015; Koutika et al., 2022). They are found in the</p>	<p>Geosciences, Soil Science, Agronomy or</p>

		<p>Batéké Plateaux in DRC (Kasongo et al., 2009; Dubiez et al., 2019), on an area limited by the southeastern end of Francevillian on the border of the granite massif in the southeast, in the east of the Bateke's Plateaux, on the M'Passa and in the Leconi valleys in the south, and the southeast of Gabon (Chatelin, 1959). Sandy soils of Central Africa are inherently nutrient-poor, although in the Bateke highlands, they are exploited for shifting cultivation by the populations. In Gabon, no studies have focused on their health. Assessing sandy soil quality is essential for crop management and soil temporal changes. Maintaining h soils quality in Central Africa as a priority is intimately linked to two other priorities i.e., increasing crop and/or forest production in the region located in the second largest rainforest ecosystems. Another overarching priority is to boost the potential for adaptation and resilience to climate change by good management of these sandy soils.</p>	<p>Environmental Science</p> <p>Language of instruction French.</p> <p>BSc GPA /4 .../5</p> <p>NB: proposal should be written in French</p>
<p>UNIVERSITY OF NAMIBIA</p>	<p><i>Speciation and Mobility of Lead and Zinc in Mine-Affected Soils around Rosh Pinah, Southern Namibia</i></p>	<p>Mining activities can significantly alter soil geochemistry through the release, transport, and deposition of metal-rich dust and mine residues. In Rosh Pinah, southern Namibia, long-term zinc and lead mining has raised environmental concern regarding the accumulation and potential mobility of potentially toxic elements in surrounding soils. Although previous studies have reported elevated metal concentrations in dust, tailings and topsoils from the Rosh Pinah area, limited attention has been given to the chemical forms in which lead (Pb) and zinc (Zn) occur in mine-affected soils and how these forms influence their mobility and environmental risk. This MSc project will investigate the speciation and mobility of Pb and Zn in soils affected by mining activities around Rosh Pinah. Soil samples will be collected along selected transects from mine-influenced areas, including locations near tailings facilities, ore-processing zones and surrounding reference sites. The study will determine total Pb and Zn concentrations, selected soil physicochemical properties, and operationally defined metal fractions using sequential extraction procedures. The results will be used to distinguish between readily mobile, carbonate-bound, Fe/Mn oxide-bound, organic/sulphide-associated and residual fractions of Pb and Zn. Relationships between metal fractions and soil properties such as pH, electrical conductivity, organic matter, texture, and carbonate content will be evaluated to identify the main controls on metal mobility. The project is expected to provide a clearer understanding of whether Pb and Zn in Rosh Pinah soils are predominantly stable or potentially mobile under prevailing semi-arid environmental conditions. The findings will contribute to environmental risk assessment, soil monitoring and mine rehabilitation planning in Namibia's base-metal mining areas. This research will also strengthen local capacity in environmental geochemistry by training a master's student in field sampling, soil analysis, metal fractionation, and interpretation of mine-related contamination processes.</p>	<p>BSc in Geology/ Environmental/ Geosciences</p> <p>Language of instruction English.</p> <p>BSc GPA /4 .../5</p>
<p>PhD Degree Seeking (36 Months)</p>			
<p>University of Buea</p> <p>UNIVERSITY of BUEA</p>	<p>Chemical Speciation And Spatial Distribution of Heavy Metals And Their Adsorption Onto Sediments of the Ndongo River, Fako Cameroon</p>	<p>The Ndongo River is a small, 16km to 46km long perennial stream in Buea, Southwest Cameroon, arising in Wokoko/Bokoko at ~750m elevation. It flows southeast through Molyko, Mile 17, and Bulu before emptying into mangrove creeks of the Tiko plain. It is fed by precipitation and runoff, experiencing severe pollution and volume reduction in its middle/lower courses. The research will employ chemical speciation of</p>	<p>BSc& MSc in Geology/ Earth Science/ Geosciences</p>

<p>Contact Person</p> <p>Dr Bokanda Ekoko Eric</p> <p>eric_ekoko@yahoo.com</p> <p>ericekoko88@gmail.com</p>		<p>heavy metals in the river sediment to evaluate the extent of pollution. Chemical speciation using sequential chemical extraction of sediment samples will measure the mobility and bioavailability of heavy metals. The study will examine the vertical distribution of heavy metals (Geochemistry) in the river transect and sediment cores to evaluate the extent of heavy metal contamination with time and the degree to which heavy metals are influenced by other sedimentological parameters such as grain size, sediment composition and organic matter. Multi statistical analytical methods will also be employed in the work. Evaluation of ecological and health risk assessment will be employed in this research.</p>	<p>Language of instruction English.</p> <p>BSc GPA $\geq 2.6/4$ $\geq 3.3/5$</p> <p>MSc GPA $\geq 2.6/4$ $\geq 3.3/5$</p>
	<p>Paleoclimatic and paleoenvironmental records from Mangrove Estuary swamp sediments in Cameroon, West Africa.</p>	<p>Mangroves are sites of high, effective carbon sinks. These intertidal forests also play important ecological and socio-economical roles. Unfortunately, mangrove habitats are disappearing continuously all over the World. This is also the case in the Tiko mangrove found in the Cameroon section of west Africa where high-density mangrove wood is heavily exploited and anthropogenic disturbance is strongly marked as the area is now occupied by the administrative and residential center from the CDC plantation, by oil palms and banana. This project seeks to know the environmental shifts that have occurred in this area over the last 10,000 years, infer if these environmental shifts are related to climate variations, and determine if human activities have affected the environment and how. Last but not least, this project will also quantify the carbon stored in the Douala estuary mangrove. The methodology to be adopted in this work will be in two phases. The field phase will constitute obtaining core samples of ca 1-2.5m from the mangrove zones. In the laboratory phase, sedimentological, geochemical and geochronological (Carbon-14) analyses will be performed to decipher the paleoclimatic and paleoenvironmental shifts over time and to establish the sedimentary carbon source and budget. This work will provide useful information to researchers all over the globe with its discoveries and provide climatic information of west Africa at large. It may also highlight the necessity to preserve our mangroves locally and globally.</p>	
<p>UNIVERSITY OF PORTHACOURT</p> <p>Prof. Ndukauba Egesi</p> <p>ndukauba.egesi@uniport.edu.ng</p> <p>ndukaegesi2019@gmail.com</p>	<p>Palaeoclimate Research Projects in west, central and southwest parts of Africa</p>	<p>Objectives are to:</p> <p>Identify and map stalagmite-bearing caves in west, central and southwest parts of Africa.</p> <p>Generate stalagmite-based palaeoclimate reconstruction in parts of the regions</p> <p>Provide critical missing palaeoclimate information of changing regional rainfall patterns and its effects on agriculture</p> <p>Improve climate projections and enhance regional preparedness to climate change issues</p> <p>Build capacity in stalagmite-based palaeoclimate research with colleagues in the regions</p>	<p>BSc in Geology/ Earth Science/ Geosciences</p> <p>Language of instruction English.</p> <p>BSc, MSc CGPA 3.0/5 or its equivalent</p>
<p>UNIVERSITY OF SCIENCE AND TECHNOLOGY MASUKU</p> <p>Contact Person</p> <p>Dr MABICKA OBAME Rolf Gael</p>	<p><i>Influence of land cover on the physico-chemical properties, carbon stocks and nitrogen carbon fluxes in ferrallitic soils of the Francevillan basin of Gabon</i></p>	<p>Soil health is influenced by various factors, including vegetation, land use, and management practices. Gabon, with nearly 22 million ha of forest, is the second most forested country in Africa and part of the Congo Basin. In addition to parent material, vegetation type and land use are a major driver of soil variability influencing both physical and chemical properties (Niu et al., 2019; Zinn et al., 2020). In its policy of economic diversification, Gabon considers agricultural development a key pillar. Indeed, with a</p>	<p>Language of instruction French.</p> <p>BSc GPA /4 .../5</p> <p>NB: proposal should be</p>

<p>rolfgaelmabickaobame@gmail.com rolfmabicka@gmail.com</p>		<p>significant reserve of arable land (5.2 million hectares) and a climate conducive to agricultural activity (annual rainfall of 1,450 to 4,000 mm), Gabon possesses substantial natural advantages for the development of agricultural production. However, the country still lags considerably behind in the development of this sector. Agricultural development depends on knowledge of soils because they are the foundation of agriculture, guaranteeing food production. Moreover, SOC plays a vital role in climate change mitigation and food security by enhancing soil fertility, water retention, and ecosystem resilience (FAO, 2017; Chen et al., 2021). Therefore, the characterization of physicochemical parameters in tropical soils is essential for understanding soil health and fertility.</p> <p>Quantifying the effect of land cover in Congo basin remains challenging because of interactions with climate, land use, and vegetation, leading to uncertainties in regional and global SOC and TN stock assessments (Barré et al., 2017; Tsozué et al., 2021 ; Luy et al., 2025). No studies have assessed how land cover affects soil physical and chemical properties, SOC, NT stocks and carbon dioxide emissions in part of the Congo basin. This study aims to fill that gap by assessing how land cover influences soil carbon and nitrogen dynamics in tropical forest soils at national scale.</p>	<p>written in French</p>
---	--	--	---------------------------------