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Modelling Climate Change Impacts on Phytotoxicity in Petroleum-Hydrocarbon-Contaminated Soils from Illegal Artisanal Refining Activities in Nigeria

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Abstract

Illegal artisanal refining activities in the Niger Delta Region of Nigeria, with focus on Bayelsa State, have led to extensive petroleum hydrocarbon contamination of soils, posing significant ecological and food security risks. This study aims to model the potential impacts of climate change, particularly alterations in temperature versus key determinants of soil health (soil moisture, acid-base dynamics, salinity etc) on the phytotoxicity of these contaminated soils. Using a combination of relevant data analytics tools, projection models, and phytotoxicity bioassays with bio-indicator plant species. How shifting environmental variables may exacerbate or mitigate the toxicity of hydrocarbon-polluted soils was assessed. The findings underscore the complex between climate dynamics and soil contamination, highlighting the need for integrated remediation and adaptation strategies. This model provides a predictive tool for managing phytotoxic risks in vulnerable agroecosystems under changing climatic conditions to sustain and enhance food security drive.

Keywords: Climate Change, Environment, Soil Hydrocarbon Contamination, Phytotoxicity, Modelling

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