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Geotechnical Engineering Practices in Foundation Design for Expansive Soils Across Sudan and Central African Republic

Marius Mandjigari[1,2], **Lucas Banganda**[3], **Victor Ngafula**[1]

[1] University of Bangui

[2] Department of Mechanical Engineering, University of Bangui

[3] Department of Sustainable Systems, University of Bangui

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Correspondence: mmandjigari@yahoo.com

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Author notes

Marius Mandjigari is affiliated with University of Bangui and focuses on Engineering research in Africa.

Lucas Banganda is affiliated with Department of Sustainable Systems, University of Bangui and focuses on Engineering research in Africa.

Victor Ngafula is affiliated with University of Bangui and focuses on Engineering research in Africa.

Abstract

Geotechnical engineering plays a crucial role in foundation design for various structures, especially in regions with expansive soils such as Sudan and Central African Republic (CAR). These soils exhibit significant swelling and shrinking cycles under varying moisture conditions, posing challenges to the stability of foundations. The study employed a mixed-method approach, combining field investigations with literature reviews. Data were collected from existing projects and documents related to foundation design practices in both countries. Statistical analysis was conducted using regression models to identify significant predictors of soil behaviour under different moisture conditions. A notable finding is the consistent use of geogrid reinforcement for expansive soils, despite varying climate and construction standards between Sudan and CAR. The proportion of geogrids used ranged from 10% to 35%, with higher usage observed in regions where soil swelling was more pronounced. The study concludes that while there are similarities in the application of geotechnical engineering practices, significant variations exist based on local conditions and available resources. Recommendations include further research into cost-effective reinforcement strategies for expansive soils. Future studies should focus on developing predictive models to tailor foundation designs for specific soil types and climatic conditions, thereby improving structural stability and longevity in regions with expansive soils. The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geotechnical Engineering, Foundation Design, Expansive Soils, Sub-Saharan Africa, Soil Mechanics, Site Investigation, Consolidation Methods*

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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