

# Analysis of Case Study of Engineering Challenges in a Specific African Country in São Tomé and Príncipe: An African Perspective

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J, o, e, l, S, t, e, w, a, r, t, ,, L, a, w, r, e, n, c, e, T, h, o, m, a, s, ,, C, l, a, r, e,  
B, r, o, w, n, ,, A, l, i, s, o, n, C, l, a, r, k

DOI: <https://doi.org/10.5281/zenodo.18559483>

# | Abstract

Engineering projects in small island developing states face distinct geological and infrastructural challenges. These are often under-represented in structural geology and engineering literature, which predominantly addresses continental settings. A systematic method for analysing these challenges from an African perspective is needed to improve project planning and risk mitigation. This methodology article presents a structured, replicable framework for analysing engineering challenges related to structural geology in São Tomé and Príncipe. Its primary objective is to detail a process for identifying, categorising, and evaluating geotechnical and geological constraints on infrastructure development within the specific context of an African island nation. The proposed methodology employs a qualitative case study approach. It comprises: 1) a desk-based review of geological maps and project reports; 2) systematic field reconnaissance to document geohazards and construction issues; 3) stakeholder interviews with local engineers and planners; and 4) synthesis of data using thematic analysis to identify recurring challenge patterns. The framework emphasises contextual factors, including material availability and localised weathering profiles. As a methodology article, this paper presents a framework rather than empirical results from a full application. However, a pilot application illustrated potential output, identifying a dominant theme: the frequent

underestimation of tropical weathering effects on volcanic bedrock slopes, which was a recurring factor in road construction failures. The developed methodology provides a structured, context-sensitive tool for investigating engineering-geological interactions in São Tomé and Príncipe. It underscores the necessity of tailored approaches that account for the specific structural geology and socio-economic conditions of African island settings. Researchers and practising engineers should adopt this framework for pre-project feasibility studies in similar geographies. Future work must involve applying the methodology to generate a comprehensive database of case-specific challenges and mitigation strategies. structural geology, engineering geology, methodology, case study, São Tomé and Príncipe, island geology, geotechnical challenges, tropical weathering This work provides a dedicated methodological framework for analysing structural geology-related engineering challenges in the under-studied context of African island developing states, aiming to standardise and improve site characterisation practices.

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