

African Journal of Climate Science and Vulnerability Assessment

Flood-Resilient Road Design Standards for the Sudd Wetland Region of South Sudan

Structured peer-review report for editorial verification

Reviewer	Reviewer 3
Recommendation	Major Revision
Journal	African Journal of Climate Science and Vulnerability Assessment
Date	24 Mar 2026

Overall Summary

This study addresses a critical infrastructure gap in South Sudan's Sudd wetland region by proposing flood-resilient road design standards. The integration of hydrological modelling, geotechnical analysis, and benefit-cost assessment is methodologically sound. However, the manuscript lacks sufficient methodological detail, validation of key assumptions, and consideration of practical implementation constraints, which significantly undermines its rigour and applicability.

Major Issues

- Insufficient methodological detail: The paper omits critical information about the remote-sensing data sources, processing methods, and validation procedures for flood frequency analysis, making reproducibility impossible.
- Unsubstantiated climate change surcharge: The 25% climate change surcharge on peak discharge lacks justification through regional climate projections or sensitivity analysis, appearing arbitrary.
- Inadequate consideration of implementation feasibility: The proposed standards (e.g., lime stabilisation, geotextiles) do not address local material availability, construction capacity, maintenance requirements, or cost implications beyond the high-level NPV.

Minor Issues

- Incomplete benefit-cost analysis: The NPV calculation of USD 4.7 million per kilometre lacks transparency regarding discount rates, cost components, and benefit monetisation methods.
- Limited geotechnical sampling: Field investigations across only three road corridors may not capture the full spatial variability of subgrade conditions in the vast Sudd region.
- Ambiguous authorship affiliation: Dual institutional affiliations (UNICAF/Liverpool John Moores University and UniAthena/Guglielmo Marconi University) require clarification regarding primary research base and ethical approval.

Questions for the Authors

- What specific remote-sensing platforms (e.g., MODIS, Sentinel-1) and algorithms were used to derive inundation data from 2010-2023, and how was cloud cover or vegetation interference addressed?
- How was the 50-year return period flood level determined, and what confidence intervals accompany this estimate given the relatively short 13-year data record?
- What are the specific material specifications and construction protocols for the proposed modified asphalt wearing courses to ensure moisture resistance in saturated conditions?

Required Changes

- Provide a detailed methodology section including remote-sensing data sources, processing steps, and validation metrics for the flood frequency analysis.
- Justify the 25% climate change surcharge with regional climate model projections or peer-reviewed literature, or replace it with a sensitivity analysis.
- Expand the discussion to address practical implementation challenges: local material sourcing, construction techniques, maintenance regimes, and training needs.
- Include a transparent breakdown of the benefit-cost analysis, specifying all cost inputs, benefit valuations, discount rates, and sensitivity tests.

Decision Rationale

The study addresses an important practical problem but contains major methodological gaps that prevent independent verification and application. Without substantial revisions to clarify methods and justify assumptions, the proposed standards lack scientific rigour and may be misleading for practitioners.