African Desert Ecology (Environmental Science)

Climate-Resilient Design Strategies for Flood Mitigation in Mozambique Coastal Infrastructure Systems

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Abstract

Mozambique's coastal regions are increasingly threatened by severe flooding due to climate change, necessitating innovative design strategies for resilient infrastructure. We employed a multi-criteria decision analysis (MCDA) framework incorporating expert elicitation and scenario-based modelling to assess and prioritise design strategies. Our MCDA identified an optimal design strategy that reduces flood risk by 30% compared to current practices, with a confidence interval of ±5% for the reduction estimate. The findings suggest that climate-resilient infrastructure designs can significantly enhance coastal resilience against flooding in Mozambique. Adoption of these design strategies should be integrated into future coastal construction projects and policy frameworks to safeguard communities and ecosystems. The empirical specification follows $Y = \vec{\beta_{0+\beta}} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Geographical, Climate Change Adaptation, Coastal Engineering, Hydrological Modelling, Resilience Metrics, Sustainable Design Principles, Ecological Integration*