African Maintenance Engineering

Climate-Resilient Design for Urban Drainage Systems in Coastal Ghana

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Abstract

Urban drainage systems in coastal areas of Ghana are vulnerable to climate-induced flooding due to rising sea levels and increased intensity of rainfall events. A hybrid modelling approach combining hydrological simulations with socio-economic data was employed to assess flood risk and identify optimal infrastructure solutions. The modelled results indicate an average reduction of 20% in flood frequency within the study area under future climate scenarios, with a 95% confidence interval for this estimate. The designed drainage system is expected to enhance resilience against flooding by managing runoff more effectively and reducing peak flow rates during heavy rainfall events. Implementation of the proposed design should be prioritised through collaboration between urban planners, engineers, and local communities. Climate resilience, Urban drainage systems, Coastal Ghana, Flood risk management The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, AfricanGeography, HybridModelling, MitigationStrategies, CatchmentManagement, ClimateForcing, EcosystemServices*

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