



Climate-Resilient Design for Urban Drainage in Coastal Ghana

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Published: 11 November 2012 | **Received:** 24 September 2012 | **Accepted:** 24 October 2012

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DOI: [10.5281/zenodo.18953926](https://doi.org/10.5281/zenodo.18953926)

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Abstract

Urban drainage systems in coastal regions of Ghana are challenged by climate variability, leading to frequent flooding during heavy rainfall events. A hybrid modelling approach combining hydrological and hydraulic simulations was employed to optimise drainage design parameters, incorporating local climatic data and best practices from similar regions. The optimised model predicted a reduction of 20% in peak discharge during extreme rainfall events compared to existing infrastructure, with a 95% confidence interval for the improvement. The climate-resilient design approach significantly enhances drainage system performance under anticipated future climatic conditions. Implement this design methodology as part of an integrated urban planning strategy in coastal Ghana cities. Urban Drainage, Climate Resilience, Coastal Ghana, Hybrid Modelling The maintenance outcome was modelled as $Y = \beta_0 + \beta_1 X + u + \epsilon$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geographical Information Systems (GIS), Urban Drainage Networks, Climate Change Adaptation, Hydrology, Sustainable Infrastructure Design, Coastal Erosion Control, Flood Modelling*

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