



Climate-Resilient Design for Urban Drainage Systems in Coastal Ghana: A Technical Data Descriptor

Kofi Adomako¹, Yaw Bawohie^{2,3}

¹ Council for Scientific and Industrial Research (CSIR-Ghana)

² Department of Sustainable Systems, Council for Scientific and Industrial Research (CSIR-Ghana)

³ Department of Mechanical Engineering, Accra Technical University

Published: 21 August 2001 | **Received:** 22 April 2001 | **Accepted:** 30 June 2001

Correspondence: kadomak@gmail.com

DOI: [10.5281/zenodo.18730977](https://doi.org/10.5281/zenodo.18730977)

Author notes

Kofi Adomako is affiliated with Council for Scientific and Industrial Research (CSIR-Ghana) and focuses on Engineering research in Africa.

Yaw Bawohie is affiliated with Department of Sustainable Systems, Council for Scientific and Industrial Research (CSIR-Ghana) and focuses on Engineering research in Africa.

Abstract

Urban drainage systems in coastal areas of Ghana are increasingly threatened by climate change factors such as sea-level rise and increased intensity of rainfall events. A systematic approach was employed to analyse existing data on rainfall patterns and sea-level projections in coastal Ghana. Statistical models were used to simulate climate scenarios and assess the impact on urban drainage systems. Expert consultations ensured that the design met local environmental standards and community needs. The analysis revealed a significant increase of up to 30% in annual stormwater volumes by under projected climate change conditions, necessitating an adaptation strategy for existing infrastructure. A robust climate-resilient design incorporating green infrastructure elements such as permeable pavements and retention ponds was proposed to manage increased stormwater volumes effectively. Implementing the recommended design will require collaboration between urban planners, engineers, and local communities to ensure long-term sustainability and resilience of urban drainage systems in coastal Ghana. 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, Climate Change Adaptation, Urban Planning, Hydrology, Resilience Studies, Geographic Information Systems (GIS), Climate-Induced Risk Analysis*

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