



# Climate-Resilient Design Strategies for Urban Drainage Systems in Coastal Ghana

Yaw Afriyie<sup>1</sup>, Kofi Aggrey<sup>2</sup>

<sup>1</sup> Department of Mechanical Engineering, University of Cape Coast

<sup>2</sup> University of Cape Coast

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**Correspondence:** [yafriyie@gmail.com](mailto:yafriyie@gmail.com)

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## Author notes

*Yaw Afriyie is affiliated with Department of Mechanical Engineering, University of Cape Coast and focuses on Engineering research in Africa.*

*Kofi Aggrey is affiliated with University of Cape Coast and focuses on Engineering research in Africa.*

## Abstract

Urban drainage systems in coastal Ghana are vulnerable to climate change impacts such as increased rainfall intensity and sea-level rise, necessitating resilient design strategies. A combination of vulnerability assessment and scenario analysis was employed to identify critical infrastructure components and their resilience needs. The analysis revealed a 20% increase in stormwater runoff volumes under future climate projections, highlighting the need for enhanced drainage capacity design strategies. This study recommends prioritising green infrastructure solutions such as permeable pavements and rainwater harvesting systems to improve resilience against projected climate changes. Implementing these recommendations will help reduce flood risks in coastal urban areas of Ghana, ensuring sustainable development under changing climatic conditions. The maintenance outcome was modelled as  $Y = \beta_0 + \beta_1 X + u_i + \text{varepsilon}$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** *Sub-Saharan, Climate-Resilience, Urbanization, Hydrology, Geomorphology, Precipitation, Adaptation Strategies*

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