



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

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## Abstract

Urban drainage systems in coastal regions of Ghana are vulnerable to climate change impacts such as increased rainfall intensity and sea-level rise. A combination of hydrological modelling and stakeholder engagement was employed to assess current system performance and propose climate-resilient upgrades. The modelled rainfall intensity in coastal areas increased by 20% under future climate scenarios, necessitating a proportional increase in drainage capacity designs. Climate-resilient design principles were successfully integrated into the urban drainage systems of Accra to enhance their ability to manage floodwaters and reduce erosion risks. Immediate implementation of proposed upgrades is recommended to ensure the long-term sustainability and resilience of these critical infrastructure components in coastal environments. The maintenance outcome was modelled as  $Y = \beta_0 + \beta_1 X + u + v + \epsilon$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** *Geographical Information Systems, Climate Change Adaptation, Hydrological Modelling, Infrastructure Design, Coastal Erosion Mitigation, Sustainable Engineering Practices, Green Infrastructure Incorporation*

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