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Adapting Coastal Communities in Sierra Leone to Climate Change: A Methodological Framework

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Abstract

Coastal communities in Sierra Leone are facing increasing threats from climate change, such as sea-level rise and more frequent extreme weather events. These challenges necessitate effective adaptation strategies to safeguard livelihoods and ecosystems. A multi-stage approach was employed: first, vulnerability assessments were conducted through structured interviews with community leaders; second, a participatory mapping exercise identified critical habitats and infrastructure at risk; third, cost-benefit analyses evaluated the financial feasibility of proposed adaptation measures. Quantitative data on climate impacts were collected from meteorological stations. Structured interviews revealed that 65% of respondents reported an increase in flooding frequency over the past decade, with significant variation across different communities (e.g., urban vs rural). Participatory mapping highlighted a high concentration of mangrove forests and fishery resources near coastlines. Cost-benefit analyses showed that investment in sea walls had a positive return on investment for reducing flood damage. The methodological framework has successfully identified areas of vulnerability and prioritised adaptation actions, providing a robust basis for future research and policy development. Communities should be engaged in the planning process to ensure ownership and sustainability of proposed solutions. Policy makers must allocate resources according to the cost-benefit analyses conducted. climate change, coastal communities, vulnerability assessment, participatory mapping, cost-benefit analysis The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Coastalization, Geographical Indicators, Climate Vulnerability, Adaptive Management, Participatory GIS, Landscape Ecology, Social-Ecological Systems*

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