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Hydropower Potential and Environmental Sustainability in Rwanda's Congo Basin: A Mixed-Methods Investigation

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Abstract

Rwanda's Congo Basin is a region rich in hydropower potential, with significant implications for energy security and environmental sustainability. A mixed-methods study combining quantitative data analysis from satellite imagery and hydrological models with qualitative interviews to assess stakeholder perspectives on sustainability. Satellite imagery revealed a potential hydropower resource of approximately 100 MW across the region, while hydrological modelling estimated water flow rates suitable for power generation. Qualitative insights highlighted concerns about biodiversity loss but also support for sustainable practices among local communities. Hydropower development is feasible in Rwanda's Congo Basin with environmental safeguards, particularly concerning the conservation of key ecosystems and species. Communities should be engaged in decision-making processes to ensure sustainable hydropower projects that protect biodiversity. Policies must incorporate robust monitoring mechanisms for ecological impacts. Hydropower, Environmental Sustainability, Mixed Methods Study, Congo Basin, Rwanda The empirical specification follows $Y = \vec{\beta_{0+\beta}} \, p \, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Congo Basin, Hydropower, Sustainability, Qualitative Research, Quantitative Analysis, GIS Mapping, Environmental Impact Assessment*

ABSTRACT-ONLY PUBLICATION

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