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Asymptotic Analysis and Identifiability in Numerical Optimization for Water-Resource Allocation in Rwanda

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Abstract

This study addresses a current research gap in Mathematics concerning Numerical Optimization for water-resource allocation in Rwanda: asymptotic analysis and identifiability checks in Rwanda. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A theorem-driven mathematical framework was developed under explicit regularity assumptions, with stability and convergence analysis of the proposed estimator. The main results show stability of the proposed functional under bounded perturbations and convergence of the estimator to a well-defined limit, characterised by $R(x) = argmin_{\theta} L(\theta; x)$. The findings provide a reproducible analytical basis for subsequent theoretical and applied extensions. Stakeholders should prioritise inclusive, locally grounded strategies and improve data transparency. Numerical Optimization for water-resource allocation in Rwanda: asymptotic analysis and identifiability checks, Rwanda, Africa, Mathematics, conference paper This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims.

Keywords: *Rwanda, Asymptotic Analysis, Identifiability, Numerical Optimization, Water-Resource Allocation, Rwanda (geographic term), Optimization Theory*

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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