



# Integrated Watershed Framework for Sustainable Agriculture and Water Supply in South Africa: A Theoretical Perspective

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## Abstract

Integrated watershed management (IWM) is a holistic approach to managing water resources in complex landscapes, aimed at balancing environmental, social, and economic needs. The IWM framework integrates hydrological modelling with socioeconomic data to predict water availability and demand under varying conditions. Implementing this framework requires collaboration between government agencies, farmers, and local communities for effective watershed management. The empirical specification follows  $Y = \beta_{0+\beta} X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** *Geographical Information Systems (GIS), Landscape Ecology, Sustainable Development, Watershed Dynamics, Multi-Criteria Decision Analysis, Ecosystem Services, Adaptive Management*

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