



# Cost-Effectiveness and Farmer Adoption of Sustainable Irrigation Systems in South African Cattle Ranches,

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## Abstract

South African cattle ranches face water scarcity challenges, necessitating sustainable irrigation system adoption to ensure agricultural productivity and environmental sustainability. A mixed-methods approach combining econometric analysis with survey data was employed to determine system costs, benefits, and farmer acceptance. The econometric model estimated that a per-hectare investment of 500–700 in sustainable irrigation systems resulted in an average cost-effectiveness ratio of 1.2:1, indicating savings over conventional methods. Farmer adoption was notably higher among those with better access to credit and technical support. Sustainable irrigation systems offer a viable solution for water scarcity prevention on South African cattle ranches, but require targeted incentives to increase farmer uptake. Targeted financial assistance programmes should be implemented to encourage adoption of sustainable irrigation systems among less financially secure farmers. South Africa, Irrigation Systems, Cost-Effectiveness, Farmer Adoption, Sustainable Practices

**Keywords:** *African Geography, Sustainable Agriculture, Water Management, Cost-Benefit Analysis, Farmer Behaviour Study, Irrigation Engineering, Participatory Rural Appraisal*

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