

MODELLING LAND USE CHANGE IMPACTS ON WATER RESOURCES IN SOUTHERN AFRICAN CATCHMENTS

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Water resources management is a contentious challenge in Southern Africa. Scarce resources, often poor quality, unfavourably temporal and spatial distribution and competing stakeholders characterise the water resources in this region. Hence, sustainable water resources management is of paramount economic and political importance.

The IWRMS (Integrated Water Resources Management System) project, a European-African interdisciplinary initiative, aims at developing an innovative computer based toolset designed as an assembly of tested, validated and well documented procedures comprising techniques of database management, remote sensing, GIS, process modelling, GUI and decision support and implementation strategies. It integrates quantitative data, qualitative (hydrological, socio-economic) methods and rules and validated numerical models in order to enable catchment management institutions to improve the regional strategic planning of catchment water resources with respect to optimising the use of water to satisfy the demand of competing stakeholders and protecting water and land resources.

Within this framework, impact analysis of climate, land use and socio-economic changes is a major component. This study presents the development and simulation of land use change scenarios and their potential influence on water availability and allocation as well as on sediment yield. A physically-based distributed hydrological model is used to simulate the water and sediment balance under various scenario conditions. As post-processing unit and user interface, a GIS application has been developed to integrate the model results with water demand and consumption, using a network approach.