

An Integrated Decision Support System for Desertification Mitigation

C.I. Bovolo, J.C. Bathurst, S.J. Birkinshaw

Introduction and Aims

A holistic view of natural and human system interactions is required in order to model desertification processes.

Here, a physical model, vegetation growth model and a socio-economic model are combined into one DSS in order to assess hydrological, soil erosion and crop yield responses to various land management, crop subsidy and climate scenarios.

Application of the DSS will centre on the development of guidelines and contributions towards policy formulation for sustainable land management relevant to local end-users, in Mediterranean Europe.

Target Areas

Italy



Agri

A 1700km² climatically marginal region. Some areas have experienced desertification (badlands erosion) and are threatened by land abandonment and the potential results of global warming.

Portugal

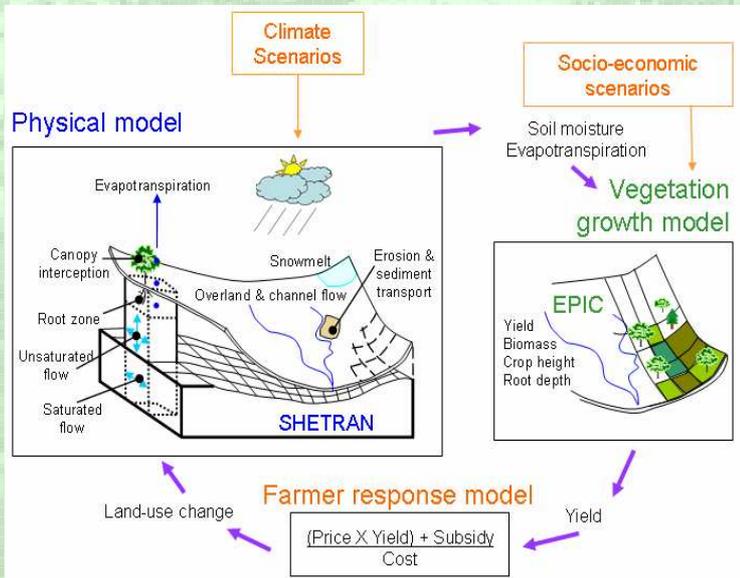


Cobres (Alentejo)

A 701km² area of relatively low relief. A large scale wheat growing campaign in the 1930-60s has led to increasing land abandonment and change of land use to pasture and eucalyptus plantations.

Both catchments are target areas for the EC funded MEDACTION project on developing policies for land use to combat desertification.

Decision Support System (DSS) Description

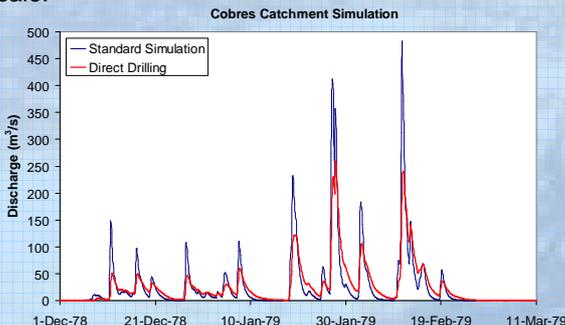


- ❖ SHETRAN provides physically based simulations of hydrology and soil erosion at the river catchment scale for given climate scenarios
- ❖ EPIC simulates crop growth and yields resulting from various agricultural practices
- ❖ The socio-economic model determines land use change resulting from farmers' decisions to select crops which maximise profit

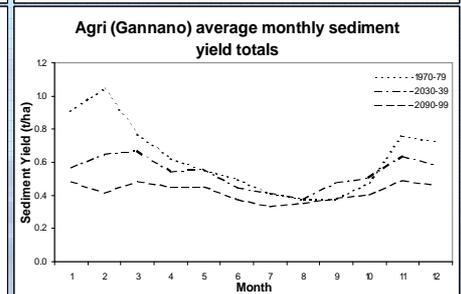
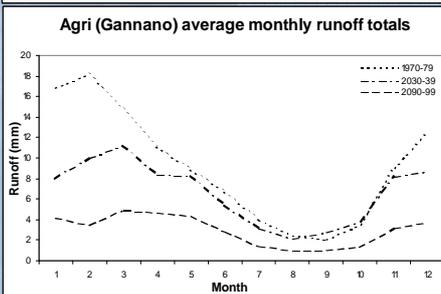
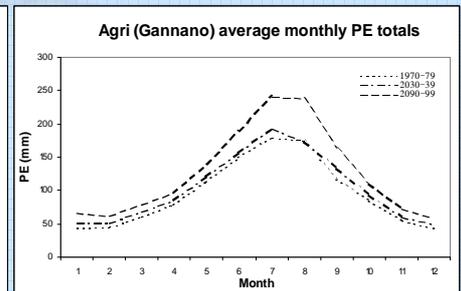
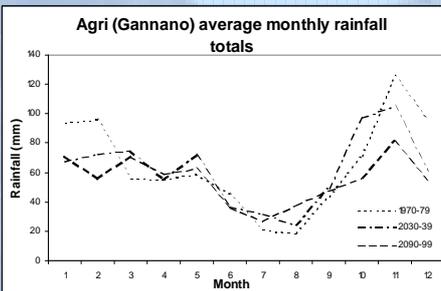
SHETRAN Simulations

As a demonstration of capability, SHETRAN simulations are presented which investigate the impacts of climate change and new agricultural technology

Cobres – New Technology Scenario: Simulations were carried out to compare the effect of direct-seed-drilling on runoff, compared with conventional ploughing techniques. In line with experimental observations, seed-drilling is shown to reduce peak discharge and increase recession flows at the basin scale.



Agri – Future Climate Scenario: Climate scenarios were generated from General Circulation Model (GCM) data. Results show that rainfall is likely to decrease and evapotranspiration increase in the future, leading to a decrease in sediment yield and runoff.



References

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- Williams J.R., 1995, The Epic Model, in Computer models of watershed hydrology, ed V.P. Singh, Water Resources Publications, Colorado, USA

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Contact Details

Isabella.Bovolo@ncl.ac.uk, j.c.bathurst@ncl.ac.uk