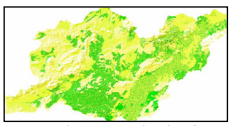
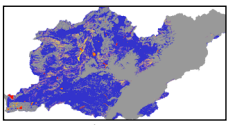
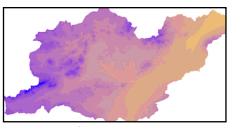
MedAction: Support for integrated watershed management

Problems – policy options – indicators

The MedAction DSS is a software instrument to support integrated planning and policy-making at the regional level. It has been developed as a generic system for planners and policy-makers in the Northern Mediterranean with special focus on problems occurring in this region, such as climate change, water availability, land degradation, desertification and sustainable farming.


Indicator: Agricultural profit


Indicator: Erosion


Indicator: Temperature

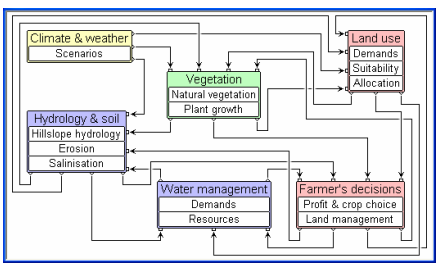
The aim of the system is to assist in the development of strategic policy plans with a time horizon of 15-30 years. To this effect, links are established between the problems in Mediterranean regions, the possible policy options and the impact of those options on a number of indicators.

The main function of the system is to provide support in:

- understanding the important processes in the region and their mutual interactions;
- identification of current and future problems in the river basins;
- impact assessment of possible policy measures, aimed at mitigating problems and evaluating different alternatives;
- the communication between actors.

Interdisciplinary integration

The core of the system is an integrated model in which individual models from previous EU-projects are linked mutually. All models are dynamic and spatially explicit, with a highest spatial resolution of 100 x 100 meter and temporal resolutions varying from minutes to years. So far the system has been applied to three regions, using the catchment as the spatial boundary.



The system diagram gives a conceptual representation of the processes in the model

Climate scenarios are translated into daily rainfall and temperature values which are used in the vegetation and hydrology & soil modules. This last module comprises all important processes in the hydrological cycle. It calculates precipitation, interception, runoff, evaporation, infiltration, soil moisture, recharge, erosion and salinisation.

Economic and demographic scenarios are translated into land use demands which are allocated on the land use map. For natural vegetation and agriculture separate modules calculate the dynamics of natural vegetation and crop types. The growth of the plants themselves is simulated by the vegetation module. The growth of crops can be influenced by land management options aimed at improving the yield: irrigation, terracing and ploughing.

The water budget is calculated in the water management module. The user can choose how to divide the available water based on input from the hydrology (resources) and land use (demand) modules.

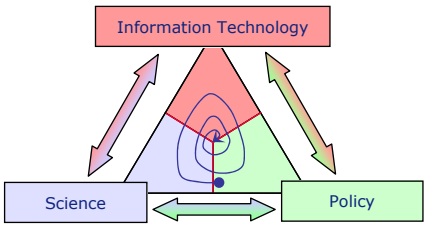
Integrating policy, science and IT

To ensure a user friendly and scientifically sound system that can be used in the actual policy-making practice, the development of the MedAction DSS takes place in close collaboration with policy-makers, scientists and software engineers.

The *policy-makers*, the end-users of the system, have as their main task to deliver the policy context and to define the problems, functions, and usage of the DSS.

The *scientists* are responsible for the main model processes and the choices of the correct scale, resolution and levels of detail.

The *IT-specialists* design the system architecture and carry out the software implementation of the models and the user interface.

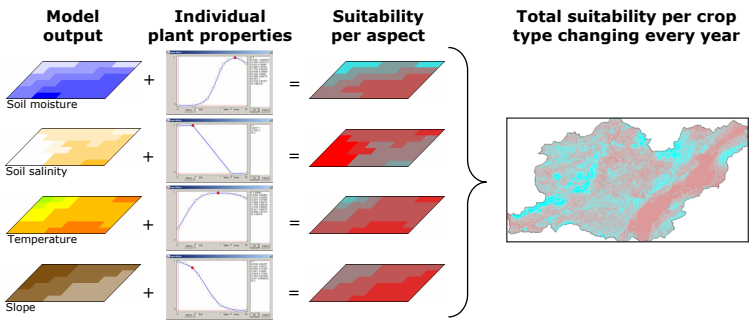


Just as important as the tasks carried out by the three different groups is the interaction between the groups, which takes place in an iterative cycle as can be seen in the figure above:

- selection of policy-relevant research and models by policy-makers and scientists;
- model coding and integration through close collaboration of scientists and IT-specialists;
- IT-specialists and policy-makers working together to design a usable and user-friendly system.

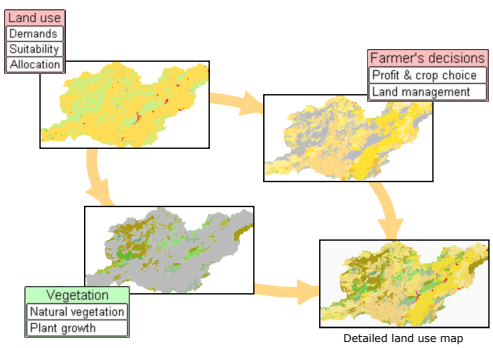
Dynamic physical suitability

Physical and socioeconomic aspects are closely linked in the integrated model. For instance, the decisions made by farmers do not only depend on the market prices and subsidies, but also on the physical suitability of the soil and the availability and price of water resources. The suitability of the soil changes over time due to a changing climate, land use and land management, and is therefore recalculated every year. Daily output from the climate & weather and hydrology & soil modules is aggregated over the year and combined with properties important for the growth of crops and natural vegetation.



Two-step land use allocation

Scenarios for land use demands are allocated on the land use map using a constrained cellular automata model that includes the current land use, zoning regulations, (dynamic) physical suitability, accessibility and the impact of surrounding land uses. Two of the land use types - agriculture and natural vegetation - are further specified in the vegetation and farmers' decisions modules to obtain the detailed land use map.



RIKS
research institute for knowledge systems

The MedAction DSS is developed by the Research Institute for Knowledge Systems (RIKS). For more information please look at www.riks.nl or contact:

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The work has been funded by the European Commission as part of contract number EVK2-2000-00085 MedAction: Policies for land use to combat desertification.

More information about the MedAction project and the partners involved can be found on: www.icis.unimaas.nl/medaction