ICReW - Improving Coastal and recreational Waters for all

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Project co-financed by the ERDF.

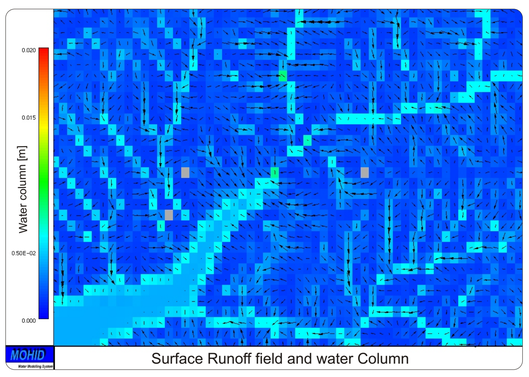
INTRODUCTION:

In the 1970's one of the first pieces of European environmental legislation was created: the Council Directive 76/160/EEC on Bathing Water Quality. This Directive has set binding standards for bathing waters throughout the European Union.
However, the 1976 Bathing Water Directive reflects the state of knowledge and experience of the early 1970s. Since 1976, epidemiological knowledge has progressed and managerial methods have improved.
On 24 October 2002, the Commission has adopted the proposal for a revised Directive of the European Parliament and of the Council concerning the Quality of Bathing Water COM(2002)581.
The ICReW project- funded by the European Community's Interreg IIIB program for the Atlantic Area was created to raise standards and help deliver the Bathing waters directive and contribute to the new European Water Framework Directive. ICREW addresses the priority national and regional issues for each participating region, with diffuse pollution presenting the greatest challenge for detection and remediation. ICREW will raise the awareness of the sustainable agricultural techniques that reduce pollution and enhance water quality - ensuring that farming and good water quality can go hand in hand

Portuguese consortium

The Portugese ICReW group has members form Instituto do Ambiente (IA), (National Coordinator), Instituto da Água (INAG), Instituto Nacional de Saúde - Dr. Ricardo Jorge (INSA), Direcção Geral de Saúde (DGS), Comissão de Coordenação e Desenvolvimento Regional do Alentejo (CCDR Alentejo), Instituto Superior Técnico (IST - MARETEC; CEHIDRO e Laboratório de Análises) and from Sub-Região de Saúde de Portalegre.
The Project is divided into 7 Pilot actions, ranging from data sampling to algal blooms.
Two study sites were selected in the Alentejo Region, an Inland water site (Montargil Reservoir) and a coastal beach (Zambujeira do Mar).
This poster shows IST's modelling effort for the inland water site. Both existing watershed models and MARETEC developed models (under the project's pilot action 4) MOHID Land are coupled to three-dimensional model (MOHID WATER) for reservoirs.
The results shown in this poster are from the SWAT model used under the BASINS interface and MOHID.

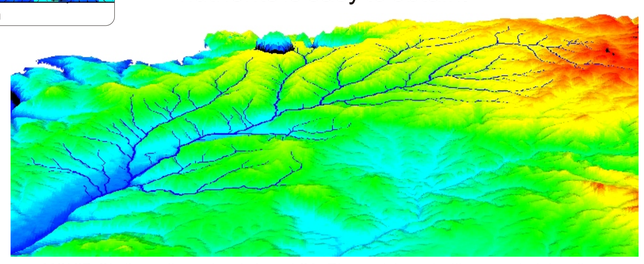
Surface Run-Off (Land Phase)



Surface Runoff field and water Column

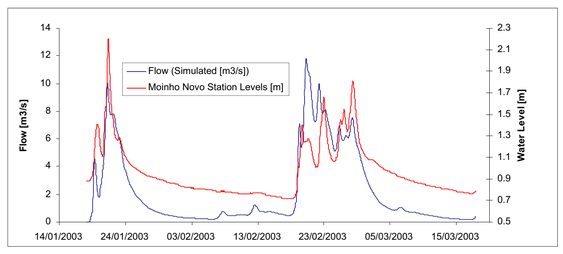
- ✓Surface Runoff is calculated in MOHID Land with the diffuse wave approach taking into account the surface slope and Manning Resistance factor calculated according to land use.
- ✓Because surface runoff is directly calculated, transport of surface properties such as sediments and nutrients is easy to obtain.

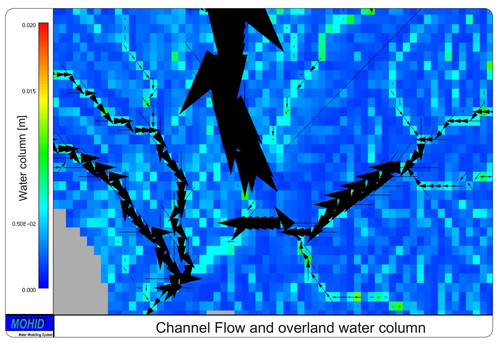
- ✓Properties transported by surface runoff are loaded into streams or water masses.
- ✓Coupling of infiltration models with MOHID Land is currently underway.


MOHID Gis three dimensional view of Sôr River catchment with generated river lines
Elevation data from SRTM C-BAND DATA PRODUCTS (NASA)

Channel Routing

- ✓MOHID LAND calculates channel flow with the kinematic wave approach
- ✓This allows the simulation of flush events in watersheds with low concentration times (under one day).



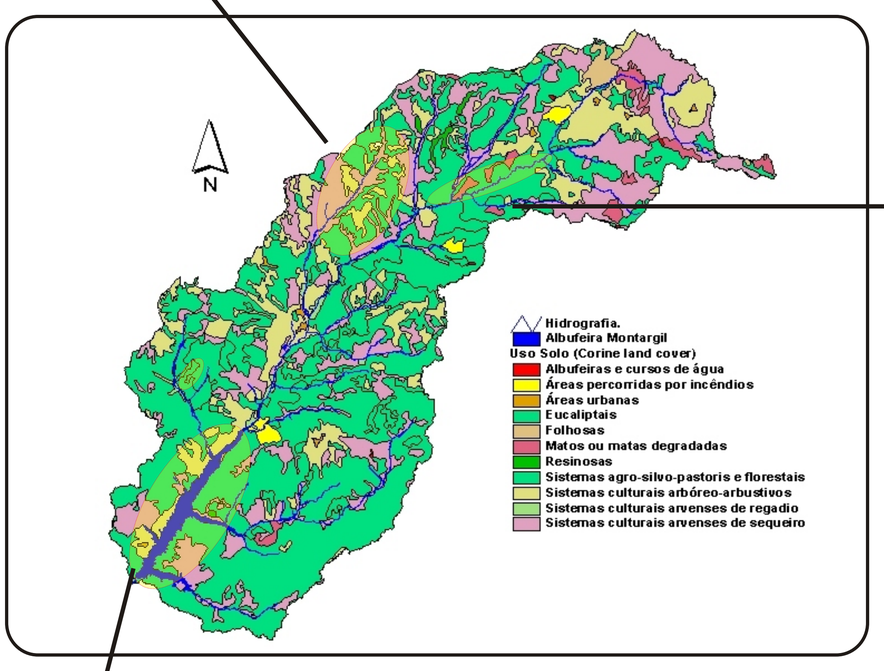


Channel Flow and overland water column

- ✓INAG's automatic hydrometric station at Moinho Novo measures Sôr river water level close to Montargil Reservoir.
- ✓The results above show that the concentration times calculated by the model for this point of Sôr river are in accordance with the water level variation measured by the station.

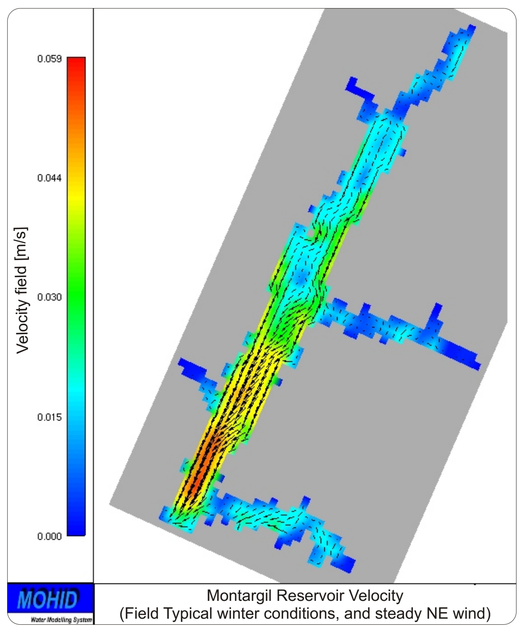
Montargil Reservoir and Sôr River Watershed

- ✓Montargil reservoir has a total volume of 165 million m3. This reservoir is feed by a watershed of 1 181 km2 with 37 point sources identified in 1999.
- ✓The reservoir is exploited since 1958. Initially it was built for agricultural purposes, but the tourist potentialities of the location (close to Lisbon) are currently recognized in the reservoir ordinance plan.
- ✓There are three bathing locations in the reservoir, Pintado, Praia dos Tesos and Foros do Mocho.
- ✓Only Pintado (close to a camping location) is classified as a bathing location according to the 76/160/CEE directive.



Reservoir Hydrodynamics and water quality

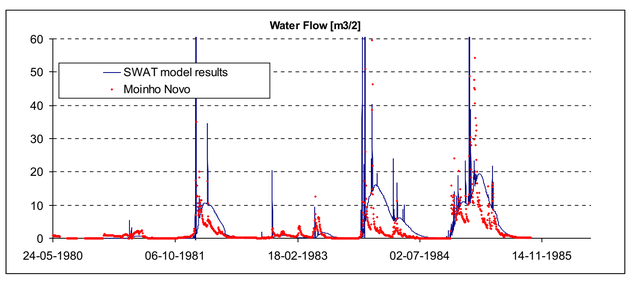
- ✓Water quality models such as WASP and Ce-Qual-w2 are coupled to MOHID hydrodynamic results to simulate water quality in reservoirs.
- ✓If a correct hydrodynamic model is obtained the effects of stratification and physical dispersion and transport can be taken into account in the water quality models.
- ✓Two weather stations are operated by INAG close to the reservoir and can supply weather data for both the watershed and reservoir model.
- ✓Coupled with watershed models the effects of diffuse pollution is taken into account for water quality in the reservoir.
- ✓IST -MARETEC and INAG are also cooperating to obtain an accurate reservoir bathymetry.



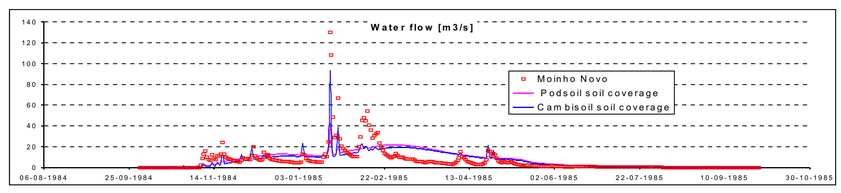
Montargil Reservoir Velocity
(Field Typical winter conditions, and steady NE wind)

Moinho novo hydrometric station daily runoff curves vs SWAT Model results (1980 - 1985)

- ✓SWAT model is used has a benchmark software for MOHID Land development.
- ✓These simulations where carried out with Soil Conservation Service Curve Number (SCS-CN) Methodology for calculation of overland water losses and variable storage routing method for channel flow.
- ✓These methods allow long simulations with daily time steps.



Model Results and data from Moinho novo station
(Obtained from http://snirh.inag.pt/)



Conclusions

Even tough watersheds are complex system, if different modelling tools are used the processes that affect water quality can be exposed.
Using available data (Corine land cover chart and FAO soil charts, and INAG's meteorological stations) both watershed models can follow the tendency show in Moinho Novo hydrometric station with reasonable accuracy.
Once water quality and flow are correctly calibrated in the watershed, diffuse pollution can be taken into account for models that simulate the reservoir.
Currently no bathymetry is avaylable for the reservoir and simulations have been caried out with a schematic bathymetry.
Coupled with data campaigns and stations this is a system that can bring benefits for watershed management. And help atchive the ICReW goals.