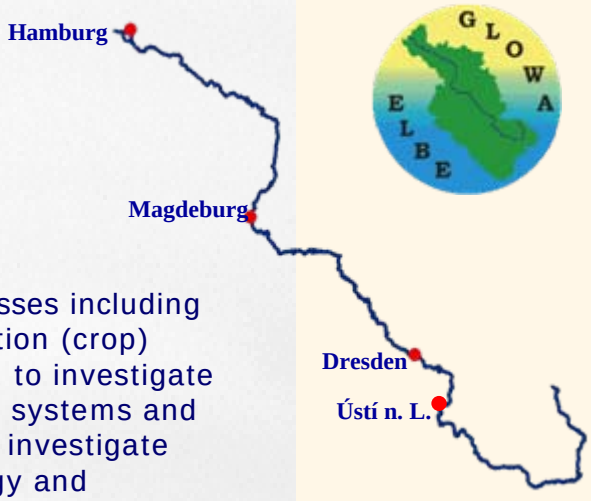
SWIM

Soil and Water Integrated Model



Model Description:
SWIM integrates the relevant eco-hydrological processes including water flow, nutrient transport and turn-over, vegetation (crop) growth and land use and water management needed to investigate climate and land use change impacts on hydrological systems and vegetation at the regional scale. It was developed to investigate impacts of land use and climate changes on hydrology and vegetation (crop yields).

Input Data: Topography, land use, soil distribution and soil parameters, surface waters and river network, climatic and precipitation stations, water and land use management data, measured discharge data and measured values of nutrient concentrations (for calibration and validation)

Results: Vertical and lateral water flows, plant biomass and crop yields, nitrogen- and phosphorus concentrations, sediment transport at daily, monthly or annual time steps and as GIS layers.

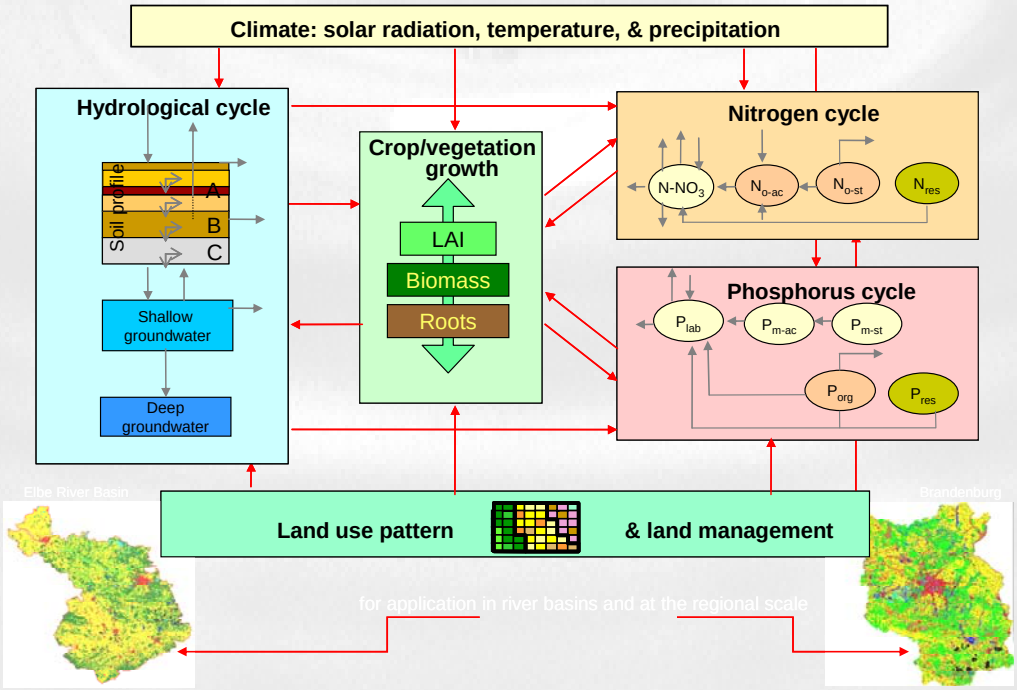
Resolution:
•Temporal simulation step: 1 day
•Spatial resolution: Hydrotopes, whereby each unique combination of the underlying geographical maps (soils, landuse, etc.) forms one hydrotope class. Lateral flows are aggregated at the subbasin scale.

Operating system: Unix, Linux and Windows platforms

Programming language: Fortran

Model run time: 2.5 hours for 10 years for the whole Elbe river basin (ca. 45.000 hydrotopes), stochastic investigations can be accelerated by parallel-computing.

Scheme of the module structure:



Developer:
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References:
Hattermann, F.F. (2005) Integrated modeling of global change in the German Elbe river basin. Dissertation

Krysanova, V. et al. (2000) PIK Report Nr.69 “SWIM (Soil and Water Integrated Model), User Manual”, 239p. (http://www.pik-potsdam.de/ ~valen/swim_manual)

SWIM

Role of the model within the GLOWA-Elbe project
Temporal and spatial high-dissolved modelling of water supply without management and the plant yields in the entire Elbe basin under global change (climate and land use changes)

Model interfaces to (input data): STAR; LUS
Model interfaces to (output data): WBalMo, MONERIS, RAUMIS

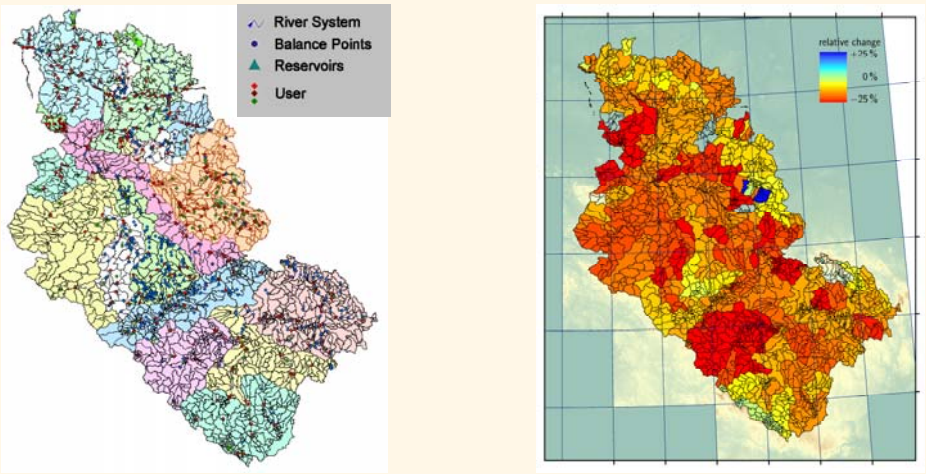
Peculiarities of the SWIM-Elbe implementation:
2255 subbasins sub-divided into 42708 hydrotopes

Time frames: Validation: 1951 – 2005
Projection: 2006 – 2055

Target groups:

- Research Institutes
- Universities
- Consultants

Model implementation and results



SWIM-Elbe implementation including subbasins and balance points, where water discharge is extracted for water management in WBalMo (left), and changes in runoff generation over the scenario period 2005-55 (right).

Potential users and application areas:
a) **Consultants** supporting water authorities in identification of programmes of measures aiming at implementation of the Water Framework Directive and in general at sustainable water and land use management;
b) **Researchers and universities** investigating processes and feedbacks in hydrology and vegetation at the catchment scale including impacts of land use and climate change

Availability:
For code and documentation please contact hattermann@pik-potsdam.de.

Resources needed for set-up of site-specific model:
High. Pending on complexity of the modelling problem and experience of user 2-3 month (without calibration).

bmb+f

The GLOWA-Elbe project is part of the BMBF funded research initiative GLOWA – Global Change in the Water Cycle. The project started in 2000 and will end in 2010.

More informations about the project are to find here: http://www.glowa-elbe.de