The Soil and Water Integrated Model (SWIM) is an eco-hydrological semi-distributed model designed for climate and land-use change impact assessment. SWIM integrates hydrological processes, crop/vegetation growth, nutrients and erosion at the river basin and regional scales. The management of land and water resources is also considered.

**Climate inputs:** Solar radiation, temperature & precipitation

**Hydrosphere**
- Glacier / Snow
- Shallow groundwater
- Deep groundwater
- River network

**Vegetation**
- Biomass
- Roots
- Wetland module
- Crop module
- Forest module

**Pedosphere**
- Nitrogen cycle
- Carbon cycle
- Phosphorus cycle

**Management:** land use pattern, land management & water management
- Reservoir module
- Water abstraction & irrigation
- Point sources & fertilizers
- Crop rotation

**Spatial and temporal coverage**

**Spatial coverage:** Several river basins in Europe, Africa, Latin America and East Asia

**Spatial resolution:** Regional and river basin; adjustable sub-units

**Temporal scale:** Until 2050 (2100) in daily time step
**Nexus coverage**

SWIM was specifically developed to investigate **climate and land use change** impacts at the regional scale, where the impacts are manifested and adaptation measures take place. The model simulates interlinked processes at the mesoscale such as runoff generation, plant and crop growth, nutrient and carbon cycling, and erosion. The approach allows simulation of all interrelated processes within a single model framework at a daily time step using regionally available data (climate, land use and soil) and considering feedbacks.

SWIM models all components of the NEXUS at the regional and water basin scale and related feedbacks, also water related energy production (hydropower, cooling of power plants) and riverine ecology.

**Inputs**

**Outputs**

The model uses 3-level disaggregation scheme: basin – subbasins – hydrotopes.

The results are presented as time series and maps for a number of variables.

**Recent applications**

SWIM is mostly used for climate and land use change applications and definition of adaptation strategies within the water nexus

🌟 Hattermann, F. F., Huang, S., Koch, H. (2014 (Accepted November)): Climate change impacts on hydrology and water resources in Germany. - Meteorologische Zeitschrift


**Further information**

**Contact:**

Fred Hattermann
hattermann@pik-potsdam.de

Hagen Koch
hagen.koch@pik-potsdam.de

**SWIM website**

Model manual