



## **Application at a national scale for Italy of the hydrological model SWAT**

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The Soil and Water Assessment Tool (SWAT) was applied to the whole Italian Region.

The goals were firstly to assess the possibility to use a simulation tool to study the impacts at a national scale on the water, nutrient and sediment balance and secondly to evaluate the use in this framework of available databases with regional or global coverage.

To this purpose some European databases have been used: the MARS database, for the climatic data at a daily resolution, the CORINE Land Cover, the SGBDE (Soil Geographic Database of Europe), for the soil types and the CCM (Catchment Characterization and Modelling) for the river network and basin boundaries delineation. Besides the Global Digital Elevation Model SRTM3 and the 5° Italian Agriculture Census (ISTAT) data were used. All of these databases have a rather coarse spatial resolution

Due to the large dimension of the study area and to the huge amount of data, the simulation of the whole national surface has been divided into nine zones that were simulated separately. Within each simulation zone a variable number of basins was included. In this way 86 Italian basins were simulated covering the 71,63 % of the Italian territory.

The model was able to delineate the basins boundaries, the subbasins and the river networks correctly. The hydrological balance was calibrated on the flow for a pilot basin in each simulation zone.

The correlation index and the Nash and Sutcliffe Efficiency were used to evaluate the simulation outputs. These indexes show low or acceptable results at daily scale and better results at monthly scale.

The sensitivity analysis and an autocalibration procedure were used in order to highlight key variables and obtain better calibration. This significantly improved the simulation results.

Other studies at a national scale or carried out using global coverage data with the SWAT model shown similar results.

In conclusion, it is possible to use the SWAT model also at national scale for Italy using the available European large scale databases, even if at least the MARS climate database resulted not completely satisfactory for an area like Italy where sea influence and great topographic variability can be a challenge for weather data interpolation procedures.