# Hydrological approach using SWAT model to assess nutrient sources in a mesoscale agricultural catchment, Case study: Roxo Catchment, South Portugal.

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Control of diffuse pollution, caused particularly by agriculture activities, has posed effort in all EU Member Countries with most countries facing problems with the implementation of the EU Nitrate Directive (91/676/EEC). In Portugal, a considerable number of areas have been classified as "vulnerable zones" of nitrate contamination from agricultural sources. Roxo Catchment, located in Beja District, Alentejo Province, South Portugal, is inside the Alqueva area which has been classified as a vulnerable zone during 2006 by the Directive 91/767/CEE. From this agricultural catchment with 352 km2, water accumulates in a reservoir (dam) that provides water supply to Beja City, making it an important evaluation site for nutrients pollution. Therefore, this study explores the use of a spatially referenced hydrological model, Soil and Water Assessment Tool (SWAT) to evaluate stream networks of the catchment, in order to asses the effects of land use on water quality along hydrological pathways and denitrification processes, estimating the water balance and sources of nitrate and phosphate in the agricultural catchment. In this study we used data from eight years of climatic information (2001-2008), 4 different land uses and 12 soils units; final product were 12 sub-basin and 313 hydrologic response units (HRU). Comparison of the simulation results with literature data revealed that SWAT provides reasonable results, which can be used for assessing the land use impact in Roxo. The sensitivity analysis indicated low dependency of the model output to minor and moderate changes in model input. The hydrological model was calibrated using the stream flow data generated and nutrient time series from 2000-2003 and for the validation we used data from 2004 to 2008. Nutrients levels were used in order to estimate temporal variability of nutrient contributions from stream networks to the main reservoir. Scenario analysis allowed us to predict the impact of land use on the stream networks and the reservoir of the study area.