

Estimation of Transported Pollutant Load in Ardila Catchment using the SWAT Model

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Excess of organic matter and nutrients in the water body promotes algae blooms, which can accelerate the eutrophication process, situation often observed in the Ardila river. This river was identified as very polluted and classified as critical for Alqueva-Pedrogão System. The aim of this study was to estimate the transported nutrients load in a transboundary catchment using the SWAT (Soil and Water Assessment Tool) model and to determine the contribution of nutrients load in the entire catchment. Ardila catchment is about 3711 Km² and is located in the East part of Portugal (22%) and Badajoz province on Spanish soil (78%). It was discretized into 32 sub-basins using automated delineation routine, and 174 hydrologic response unit. Monthly average meteorological data (time period from 1947 to 1998) were used to generate daily values through the Weather Generator Model incorporated in SWAT. Real daily precipitation series data (1931 to 2003) were introduced. The model was calibrated and verified using: flow data (1950 to 2000) and nutrients (1981 to 1999). Model performance was evaluated using statistical parameters, such as Nash-Sutcliffe efficiency (NSE) and root mean square error (R²). Calibration and verification flow results showed a satisfactory agreement between simulated and measured monthly data from 1962 to 1972 (NSE=0.8; R² = 0.9). The results showed that the most important diffuse pollution comes from the two main tributary of Spain. The estimated nitrogen and phosphorous load contribution per year was about 72%, 59% respectively (Spain) and 28%, 41% (Portugal). The SWAT model application reveals a useful tool for integrated water management.

Keywords: diffuse pollution, SWAT model, nutrients, integrated water management