



Nutrient sources in a Mediterranean catchment and their improvement for water quality management

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Changes in land-use or management strategies may affect water outflow, sediment and nutrients loads. Thus, there is an increasing demand for quantitative information at the catchment scale that would help decision makers or planners to take appropriate decisions. The characterisation of water status, the description of pollution sources impact, the establishment of monitoring programs and the implementation of river basin management plans require an analysis of the current basin status and estimates of the relative significance of the different sources of pollution. Particularly, in this study the Soil and Water Assessment Tool (SWAT2000) model was considered since it is an integrated hydrological model that simulates both the qualitative as well as quantitative terms of hydrological balances. It is a spatially distributed hydrological model that operates on a daily time step at catchment scale developed by the Agricultural Research Service at the U.S. Department of Agriculture. Its purpose is to simulate water sediment and chemical yields on large river basins and possible impacts of land use, climate changes and watershed management.

Integrated hydrological models are, nowadays, needed to support the implementation of integrated water management plans and to comply with the current requirements of the European Water Directive. Actually, they can help in evaluating current water resources, identify pollution sources, evaluate alternative management policies.

More specifically, the analysis has been applied to the Oreto catchment (77 Km²), an agricultural and urbanised catchment located in Sicily (Italy). Residential, commercial, farm and industrial settlements cover almost the entire area. The climate is Mediterranean with hot dry summer and rainy winter season. The hydrological response of this basin is dominated by long dry seasons and following wetting-up periods, during which even large inputs of rainfall may produce little or no response at the basin outlet. Regarding the inventory of point and non-point pollutants sources, the river receives a number of point source pollutants from small villages and some outskirts of Palermo, most of them untreated, and non point source pollutants from agricultural cropland and zoo-technical farms. In particular, the Oreto river receives untreated wastewater and stormwater from Altofonte (8200 inhabitants) and Pioppo (2500 inhabitants).

The model was first calibrated using meteorological, flow and water quality data collected at various stations through-out the catchment, in order to predict water and nutrient concentrations at the catchment outlet and then was used to evaluate the potential impact of various management strategies on surface water quality. The results demonstrates that point and non-point polluting sources have to be contiguously analysed because they concur to the definition of river water quality both during wet and dry periods.