Equifinality and uncertainty of the quali-quantitative response of a natural catchment

A. Candela (1), G. Aronica (2), G. Viviani (1)

(1) Università di Palermo, Palermo, Italy, (angela@idra.unipa.it / Fax: +39 091-6657749), (2) Università di Messina, Messina, Italy

Water quality impact due to nonpoint source pollution could be significant particularly in environmentally sensitive areas. This type of pollution, mainly of agricultural origin, constitutes a significant fraction of the total pollution loads discharged into a water body. Assessment of source magnitude may be difficult because it is a function of such factors as catchment hydrology, soils, geology, vegetation as well as human-origin pollution loading.

The Generalised Likelihood Uncertainty Estimation (GLUE) approach is presented here as a tool for estimating the predictive uncertainty of a conceptual quali-quantitative model for continuous daily simulation. GLUE is based on Monte Carlo simulation, it recognises the possible equifinality of different parameter sets and assesses the likelihood of a parameter set being acceptable simulator when model predictions are compared to observed field data.

The GLUE methodology is applied to quali-quantitative simulations of a Sicilian catchment characterised by a broad range of hydrological aspects. This paper explores how the limitations inherent in the modelling processes can be reflected in the estimation of predictive uncertainty and, moreover, the choice of an appropriate likelihood function is discussed.