

A DISTRIBUTED HYDROLOGIC AND WATER QUALITY MODEL FOR NONPOINT SOURCE POLLUTION ASSESSMENT

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ABSTRACT

The environmental models development, in order to evaluate nonpoint source pollution impacts and water resources management, is one of the researches developed at the DIFA (Dept. of Engineering and Physics of Environment, Basilicata University). This paper shows the development and the field application of an hydrologic and water quality distributed model, based upon a spatial discretization of the territory into elementary square cells, that schematises the main hydrological processes of degradation and transport of nutrients, performed on a control volume build on the single cell. For the evaluation of the local generation of surface, sub-surface and groundwater run-off has been used an evolution of the WetSpa (Yongbo and De Smedt, 2000) distributed hydrologic model, coupled with a procedure for the nitrogen alteration and transport assessment. Preprocessing and following visualization of outputs has been carried out using GIS software. The study area is the 350 km² of the Camastra lake basin (South Italy). The overall course of Camastra is an example of high environmental sensitivity due to the stream regime and the multiple uses of the lake waters. The water quality data used for the model calibration have been collected in a monitoring campaign performed over four year (1996-2000). Calibration of the model against observed data shows good prediction of nitrate-nitrogen and ammonium-nitrogen. Further studies will concentrate on the correlation of model outputs with the inputs of the river water quality model (already developed at the DIFA), and the integration of the simulation models with a decision support system, in order to define an instrument for the monitoring and the assessment of nonpoint sources pollution, that allows the development of a plan to reduce impact of diffuse contaminants on water resources.

KEYWORDS: Distributed hydrological models, nonpoint water pollution, Nitrate-nitrogen.