

MODELLING OF POINT AND DIFFUSE POLLUTION IN A MEDITERRANEAN WATERSHED

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A fast growing economy and a more demanding population in Europe is leading to increasing socio-economic pressures, and large-scale land use and landscape changes are taking place. An increasing pressure is put on water resources and conflicts are arising for water distribution among different stakeholders, and degradation of water quality is exacerbating the problem. To this purpose a generic modeling was applied to evaluate and predict the surface and subsurface water quality and quantity as affected by anthropogenic activities in the Burano-Po di Volano watershed (Italy). For the flow and pollutant routing component and for the unsaturated flow and pollutant transformation and transport two different models were applied. A physically based model SWAT (Soil and Water Assessment Tool) and a conceptual model HSPF (Hydrologic Simulation Program-Fortran). The Saturated flow and pollutant transformation and transport component was carried out using MODFLOW (Modular 3-D Flow Model). In-stream water quality component was evaluated applying the appropriated module of the HSPF model. This module is a one-dimensional, steady state water quality and eutrophication model. The modeling effort concentrated on both point and diffuse pollution, mainly nitrogen, phosphorus and pesticides. The studied watershed is a heavily drained and has a very high density of artificial channels. The area is almost flat, most of it being below the sea level. It is of particular importance because it drains directly in the Sacca di Goro lagoon that has a big economical importance due to the high number of shellfish farming. This part of the Adriatic Sea is subjected to eutrophication because it receives freshwater inputs from the studied watershed, rich in organic and mineral nutrients. The models were used to allocate the pollutant loads according to the different types of activities and landuse in this catchment allowing to:

- Simulate the impact of management practices on water quality in open drains, which are used for both irrigation and drainage purposes.
- Hierarchize pollutants loads according to the type of anthropogenic activities.
- Asses capacity of natural wetlands in the reductions of pollutant loads reaching the coastal zone.
- Link anthropogenic activities with algae bloom which are often observed in the coastal zone of the Po delta.

KEYWORDS: Water quality, Catchment management, Groundwater resources, Diffuse pollution, eutrophication, Integrated modeling.