

## SPECIFIC VULNERABILITY OF THE CASERTA PLAIN (IT) TO NITROGEN LOSSES

Gianluigi BUSICO <sup>1</sup>, Emilio CUOCO <sup>1</sup>, Micòl MASTROCICCO <sup>1</sup>, Maurizio SIRNA <sup>1</sup>,  
Dario TEDESCO <sup>1</sup>

<sup>1</sup> Department of DISTABIF, University of Campania “Luigi Vanvitelli”, Via Vivaldi 43-81100 Caserta, Italy,  
[gianluigi.busico@unicampania.it](mailto:gianluigi.busico@unicampania.it), [emilio.cuoco@unicampania.it](mailto:emilio.cuoco@unicampania.it), [micol.mastrocicco@unicampania.it](mailto:micol.mastrocicco@unicampania.it),  
[maurizio.sirna@unicampania.it](mailto:maurizio.sirna@unicampania.it), [dario.tedesco@unicampania.it](mailto:dario.tedesco@unicampania.it)

The use of nitrogen (N) fertilizers in agricultural fields and the increasing urbanization are among the most important non-point sources of pollutants. Efforts to identify and reduce N loads percolating towards shallow aquifers led scientists to develop various tools for groundwater vulnerability assessment. The aim of the study is to propose an integrated approach for vulnerability assessment combining indices of low data requirements to describe the vulnerability to nitrogen species for a) the topsoil using LOS (Aschonitis et al. 2013), b) the unsaturated zone using AVI (Van Stempvoort et al. 1992) and c) the aquifer system using SINTACS (Civita and De Maio 2004). This attempt aims to change the current perspective of the vulnerability maps from two-dimensional (latitude, longitude) to four-dimensional visualization by adding the dimensions of depth and time. The Caserta Plain (IT), was selected as case study due to its high population density and to the intensive agricultural activities. The application of the proposed approach to the study area, highlighted the strengths and weaknesses of each method and at the same time showed that their combination can provide an overall view of the threats posed to groundwater resources by the human activities affecting the territory. Considering both the benefits and the issues of the proposed approach, overall the combination of the aforementioned indices can be employed as a robust tool to assist water managers in establishing detailed monitoring programmes and measures to achieve the Water Framework Directive objectives of good groundwater status.

### References

- Aschonitis VG, Salemi E, Colombani N, Castaldelli G, Mastrocicco M (2013) Formulation of indices to describe intrinsic nitrogen transformation rates for the implementation of best management practices in agricultural lands. *Water Air Soil Poll.* 224(3):1-14.
- Civita M, De Maio M (2004) Assessing and mapping groundwater vulnerability to contamination: the Italian “combined” approach. *Geofísica Int.* 43(4):513-532.
- Van Stempvoort, D, Ewert L, Wassenaar L (1992) AVI: a method for groundwater protection mapping in the prairie provinces of Canada. *Prairie Prov. Water Board Report*, Regina, SK.

