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## Groundwater Vulnerability Assessment in the Naturtejo UNESCO Global Geopark, Portugal

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Nowadays, groundwater vulnerability assessment has become a useful tool for groundwater contamination prevention. Groundwater vulnerability maps provide useful data to protect groundwater resources and work as a tool for the improvement of changes in agricultural patterns and land use applications. The study area of this research survey is the Naturtejo UNESCO Global Geopark, located in central inland Portugal and corresponding to a mainly rural territory where intensive agricultural practices showed a rising tendency in the last decades. The most used method of vulnerability evaluation is the DRASTIC index. In this survey, a modified DRASTIC method, DRASTICAI, is introduced. A new attribute designated as Anthropogenic Influence is introduced. Map algebra in a GIS environment allowed the computation of two maps by overlaying the needed attributes. The Vila-Velha-de Rodão and Idanha-a-Nova municipalities show moderate to high vulnerability and, therefore, in need of monitoring, since intensive agricultural practices are the main economic activity. The algebraic subtraction of DRASTIC and DRASTICAI maps revealed a considerable increase in the risk of contamination, over the surveyed area, namely in Idanha-a-Nova where it is observed risk increase up to 45 points, changing from moderately vulnerable to highly vulnerable and, therefore, stressing the importance of anthropogenic activities.

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## Concentration of Chemical Species in Piezometers in An Agricultural Watershed, Santa Catarina, Southern Brazil

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This study aims to analyse the concentration of chemical species in piezometers installed in riparian forests and in pasture, and in river, in Concórdia watershed, Lontras, SC, Brazil. Water samples were collected during both baseflow periods and storm events. Samples were analysed to determination the of concentration of chloride (Cl<sup>-</sup>), nitrate (NO<sub>3</sub><sup>-</sup>), phosphate (PO<sub>4</sub><sup>3-</sup>), sulfate (SO<sub>4</sub><sup>2-</sup>), and the carbon series of total organic carbon (TOC), inorganic carbon (IC) and total carbon (TC). The carbon series concentrations were bigger in summer. TOC concentrations were higher in piezometers than in river. Higher IC concentration in summer may be related to higher turbidity related to more intense rain events. The mean anion concentrations were higher in the piezometer located in the watershed outlet. Concentrations in river were more diluted when compared to piezometers.

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