
Geostatistical modelling of groundwater data - a vulnerability assessment approach in a transboundary watershed

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ABSTRACT

Groundwater's contamination in fluvial environments shows high variability in space. Furthermore, it is also a non-stationary process because spatial variability depends strongly on the distance to pollution sources, the amount of precipitation and other climatologic variables.

Water's quality has an important role by being abundantly used in agriculture and livestock activities, one of the economic incomes for local communities. Characterization, monitoring and control of the impact due to several anthropogenic activities is of crucial importance.

The core of this work is the spatial characterization for contaminants distribution within the transboundary watershed – Portuguese and Spanish territory - of the Águeda River. Seventy four point-support data were sampled and monitored for a set of physical and chemical parameters.

The methodology presented herein deals in a first step with the achievement of a vulnerability map which allowed the subsequent overlap with the main risk focus and a better land use planning. In a second step a coupled multivariate statistics and geostatistics based methodology for the measured pollutants was used for pollution prediction in a generalized unknown space domain of the study area.

The used models showed to be suitable for evaluating the environmental impact of the considered contaminants (such as e.g., Electrical conductivity; Phosphates; Nitrates; Arsenic; Uranium and Manganese) and improved the local groundwater system's management.

The obtained results allowed further feasibility studies of different treatment schemes and the development of specific monitoring activities.