

Surface water's quality and definition of risk areas in Agueda's transboundary watershed

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This paper focuses on the environmental characterization of Agueda watershed. The Agueda project is an ongoing work in the framework of the POCTEP program, Portugal and Spain. The main core of the present work is the development of a methodology to be used as a generic and flexible tool for a dynamic risk analysis, allowing the definition of leverage strategies e.g. to land management in this transboundary region.

This work started with the assessment of the quality of surface water. A sampling campaign was conducted between October and December of 2011. Fifteen surface water samples were collected along the tributary rivers and twenty three more along the main river bodies. The following chemical parameters were analyzed: Biochemical Oxygen Demand (BOD), Dissolved Oxygen Concentration (DO), Ntotal; pH, Temperature and Electric Conductivity were analyzed. The dissolved oxygen concentration (DO) and the biochemical oxygen demand (BOD) were used as indicators of environmental pollution. A coupled hydrodynamic and water dispersion model implemented in QUAL2kw software was used to simulate the distribution of these parameters along the river. The simulation results are consistent with field observations and demonstrate that the model has been correctly calibrated

The second part of our work is the mapping of vulnerability across the Agueda watershed. The DRASTIC Pesticide index was used. The DRASTIC is a parametric method (developed by US EPA) for evaluating the intrinsic vulnerability of groundwater systems on a regional scale. It takes into account the inherent geological, hydrological and hydrogeological characteristics of an area, but is independent of the nature of human activities. The parameters included in the method are depth to water (D); net recharge (R), aquifer media (A), soil material (S), topography (T), impact of vadose zone (I) and hydraulic conductivity (C) of the aquifer. Higher DRASTIC scores implies higher likelihood of contamination. The DRASTIC method includes two versions: the generic DRASTIC and the pesticides DRASTIC where the seven parameters' weights are reassigned in order to reflect the relevance of anthropic activities.

A Geographical Information System (GIS) was built to overlap the maps of vulnerability classes and surface water quality's parameters. The joint visualization allows the identification of regions of, high-high, High-low, low-high and low-low, vulnerability-risk.

The high-high areas are located mainly in the central zone which is the tertiary aquifer and the largest urban area. Feasibility studies of different treatment schemes and the development of specific monitoring activities must be addressed in future work.

Keywords: Watershed, DRASTIC Pesticide, QUAL2kw simulation, risk regions