Combination of intrinsic and specific vulnerability mapping for the protection of groundwater against diffuse pollution at catchment scale

Jean-François Vernoux, Nicolas Surdyk, Frédéric Barrez

To cite this version:
Jean-François Vernoux, Nicolas Surdyk, Frédéric Barrez. Combination of intrinsic and specific vulnerability mapping for the protection of groundwater against diffuse pollution at catchment scale. Groundwater Vulnerability - Emerging Issues and New Approaches. IMVUL Conference, Jul 2012, Paris, France. hal-00717605

HAL Id: hal-00717605
https://hal-brgm.archives-ouvertes.fr/hal-00717605
Submitted on 13 Jul 2012

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.
Combination of intrinsic and specific vulnerability mapping for the protection of groundwater against diffuse pollution at catchment scale

J.F. Vernoux, N. Surdyk (BRGM), F. Barrez (IRSTEA)

Solutions such as agri-environmental measures, land management, afforestation and grasslands are used to protect groundwater, especially when used for human water supply, against persistent chemical contaminants, such as nitrates and pesticides. The cost of such measures, which can be very important if considering the whole catchment area, requires having a specific and optimized approach based on the identification of areas where the actions will be the more efficient. A methodology was developed in order to delineate such protection areas and action plans by combining intrinsic and specific vulnerability mapping.

The proposed method of intrinsic vulnerability mapping was adapted from existing methods to different types of aquifers (continuous aquifer, discontinuous fractured aquifer, discontinuous karstic aquifer). The needed parameters for multicriteria analysis are: soil characteristics, efficient rainfall, infiltration in the overlying layers, unsaturated zone thickness, aquifer permeability and karst specific parameters. For the specific vulnerability (relative to pesticides) we used a simple indicator derived of the equation of vulnerability of groundwater from the indicator EPRIP (Padovani et al., 2004; Trevisan et al., 2009). The data needed for the calculation come from diverse sources (measures, pedotransfer functions) and are integrated with a G.I.S. This indicator uses a modified version of the attenuation factor (Rao et al., 1985) to determine if a substance has a risk to leach through the root zone and the unsaturated zone depending on the properties of the soil and the molecule. The use of the G.I.S. allows also displaying zones at risk most at risk more easily. The choice of the indicator EPRIP as the base for this method of estimation of the specific vulnerability is a point which can be questioned. Indeed, no study of comparison selected it as the best indicator. Nevertheless several reasons have advised to select this indicator to work out a method of estimation of the specific vulnerability. This indicator allows taking into account, at the same time, properties of substances, soil and climate. Moreover, it uses another important data: pesticide application dose. This indicator was estimated within the framework of the European project CAPER (Reus et al., 2002). The used method is also open to criticism; studies are in progress to test the validity of the results on several sites.