

Interactive comment on “Groundwater vulnerability assessment to assist the measurement planning of the water framework directive – a practical approach with stakeholders” by K. Berkhoff

Anonymous Referee #1

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General comments: The paper describes an interesting approach to use a model based evaluation scheme for groundwater vulnerability assessment in a stakeholder process according to the requirements of the European Water Framework Directive. The groundwater vulnerability (following the definition of IPCC) is assessed by the help of two models, STOFFBILANZ and DRASTIC. STOFFBILANZ allows the calculation of the exposure to external impacts (nitrogen load from agriculture) while DRASTIC is used to determine the sensitivity (natural groundwater pollution potential). Both are calculated on a 500x500 meter grid. Additionally, the adaptive capacity of the region to

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reduce impacts on groundwater was evaluated in an actors' platform. The vulnerability assessment intended to support the stakeholders in the development of acceptable groundwater protection measures. Therefore, aspects of cost efficiency and acceptance by farmers have to be considered. For the identification of appropriate measures the actors' platform including stakeholders from different interest groups discussed 14 groundwater protection measures as part of the PartizipA project. The manuscript is well structured and presents quantitative as well as qualitative aspects. It addresses relevant scientific questions within the scope of HESS and presents novel concepts. It is acceptable for publication with some modifications.

The central task of a revision should be the concentration on the main issue, the use of a model based assessment approach in an actors' platform. This implies the following consequences.

- It has to be shown that the chosen models are appropriate for a stakeholder process. The ability of both models to produce results on a local scale is an important precondition for the acceptability of the results. Have these local results been evaluated? At least DRASTIC has the problem of subjectivity associated to the selection of the ratings and weights. Such a selection can strongly affect the result of the final vulnerability map. If farmers are involved in the stakeholder process, they have a lot of local knowledge about the ground water vulnerability in specific areas which cannot be covered by the general parameters of DRASTIC. Therefore, it has to be asked if a sensitivity analysis has been performed. - Other models are used in the region of Lower Saxony supporting the planning of ground water protection measures according to the WFD. Differences to this models and/or advantages of the own approach should be discussed a little bit. - The main source of groundwater pollution in the study region is organic nitrogen from livestock (especially pigs and chicken). Having this in mind, the described groundwater protection measures would have a strong economic impact on the farms in the region. Converting arable fields into grassland would imply a (complete?) change of the production system. Are there any detailed farm related cal-

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culations available for the region to estimate the possible economic and social impacts for the farms? This would be a crucial prerequisite for the acceptability of the proposed measures. - A more elaborated description of the stakeholder process is missing. The use of models in stakeholder processes is very sensible and needs a substantial participation effort. The paper doesn't describe if this process has taken place in the project and how it was structured. Further more, the good recommendations given in the conclusions are not directly derivable from the descriptions in the paper. This should be elaborated a bit more.

Comments on abstract and references:

- More information about the usability of the assessment results for the stakeholders should be given in the abstract. - More international references are needed. Reference list is incomplete (see below).

Purely technical corrections:

Title (and other parts of the paper): "Programme of measures" (according to WFD) instead of "measurement planning".

Page 1139, line 19: reference for 'International River Basin District Ems, 2005' is missing in the reference list

Page 1141, line 28: Fig 2 instead of Fig 1

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 4, 1133, 2007.

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