

Interactive comment on “Forecasting land-use change and its impact on the groundwater system of the Kleine Nete catchment, Belgium” by J. Dams et al.

Anonymous Referee #2

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General comments

In general this paper describes a method to forecast effects of land use/cover (LULC) changes in groundwater resources. For estimating the potential impact of LULC changes three models were coupled: a land use change model (CLUE-S), a hydrologic model (WetSpass) and a groundwater flow model (MODFLOW). This study was conducted in a 580 km² basin in Belgium. The subject covered by this paper is indeed a very relevant research topic in catchment hydrology. The state-of-the-art in this subject is still far from satisfactory, thus, publications of relevant research in this subject

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should be encouraged in HESSD. In the present paper, however, there are many shortcomings that have to be clarified before publication. Moreover, no novel concepts have been presented in this paper.

Specific comments

The method followed by the authors have the following technical shortcomings:

1) It is not clear from the text how the IPCC scenarios were used to predict the LULC changes in the study area. It is also not clear why the Authors did not considered changes in the climatic forcings (e.g. precipitation and temperature), which are the main drivers of the water cycle. See p.4271 l. 7-8.

2) The land cover model seems to have parameters obtained from empirical analysis. Please show them and give indication of the goodness of the fit of the model in the calibration and validation faces. This is not valid unless a serious cross-validation study shows that this is possible.

3) There is no reference in the text with regard to the calibration and validation of the hidrologic model employed. Please indicate the calibration and validation periods, and several measures of efficiency (Nash-Sutcliffe efficiency coefficient, bias, RMSE, etc.).

4) A long term forecasting with no serious uncertainty analysis is very risky. Conclusions derived based on this footing might be misleading. Please carry out a serious analysis of the uncertainties involve in all models used in these paper.

5) Please consider the following suggested literature.

Suggested References

1) Bronstert, A., Niehoff, D., Bürger, G., (2002). Effects of climate and land-use change on storm runoff generation: present knowledge and modelling capabilities. Hydrol. Process. 16 (2), 5098211;529.

2) Hundecha, Y, Bårdossy (2004). Modeling of the effect of land use changes on the

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runoff generation of a river basin through parameter regionalization of a watershed model. *Journal of Hydrology* 292 (2004) 2818211;295.

3) Samaniego L., Bárdossy A.(2006). Simulation of the Impacts of Land Use/Cover and Climatic Changes on the Runoff Characteristics at the Mesoscale. *Ecological Modelling*, Vol. 196, Issue 1-2, pp. 45-61. [dx.doi.org/10.1016/j.ecolmodel.2006.01.005](https://doi.org/10.1016/j.ecolmodel.2006.01.005)

Technical corrections

1) There are many sentences that are very vague and do not provide numerical evidence, i.e. p4280, l 18-21. Please improve them.

Interactive comment on *Hydrol. Earth Syst. Sci. Discuss.*, 4, 4265, 2007.

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