

## ***Interactive comment on “Threshold values and management options for nutrients in a catchment of a temperate estuary with poor ecological status” by K. Hinsby et al.***

**K. Hinsby et al.**

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Reply to reviewer #2 comment: Hydrol. Earth Syst. Sci. Discuss., 9, C1796–C1797, 2012. [www.hydrol-earth-syst-sci-discuss.net/9/C1796/2012/](http://www.hydrol-earth-syst-sci-discuss.net/9/C1796/2012/) :

Please note that the numbered replies below refer to numbers inserted in a separately uploaded annotated version of the reviewer #2 comments. Please consult this document in order to identify which reviewer comment our replies refer to.

Re 1: We disagree. In contrast this study should be of interest to a broad scientific audience including hydrogeologists, hydrologists, hydrochemists, agronomists, freshwater  
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and marine ecologists etc. - globally.

Re 2: We agree on this - there's no need for equation 2, and we will remove it in the final version

Re 3:

This is only partly correct, we do apply previously established models and model combinations, but e.g. the grid size of the integrated hydrological model has been reduced and most model simulations are made exclusively for this study.

Re 4:

Regarding the comment about the regression model 'without any process based ideas behind': The idea behind the empirical modeling approach is indeed to treat the estuarine ecosystem as 'a black box' and analyze relationships between input and output parameters without pre-defined assumptions, in order to get a data based answer. This does not imply that we are not aware of or recognize the many complex interactions governing the response of the estuarine ecosystem to nutrient loadings. We have previously applied dynamic ecosystem models, and found good agreements in the response, when compared with the empirical models. However, in the present context we have used the empirical approach, as it has some advantages over the use of dynamic models. We fully recognize the limitation of both types of models. However, a discussion of this will further expand the already rather long manuscript, and we find it beyond the scope of this paper, which focus on the derivation of groundwater and stream threshold values.

Re: 5

We disagree, and we do not understand the standpoint of the reviewer. The work is certainly relevant and applicable outside Denmark. There has been a growing awareness in Europe and elsewhere that the quantitative, chemical and ecological status of different water bodies are closely linked, and that a holistic approach as e.g. promoted

in the European Water Framework and Groundwater directives is needed in order to be able to assess the interactions between the different water bodies and ecosystems, and their impacts on each other. This special issue (SI) deals with the interaction of surface and subsurface water bodies in coastal regions. Many papers in the SI consider sea water intrusion into coastal aquifers jeopardizing the chemical status of the aquifers. Here we present a general approach to the derivation of groundwater and stream threshold values for chemical status assessment of these waters; such work is required in order to protect e.g. coastal water ecosystems from excess nutrient loadings. The approach and principles are applicable in coastal waters, globally, and may be applied for other ecosystems, such as lakes as well.

In this context we would furthermore like to emphasize, that we find that our transdisciplinary approach fits the Aims and scope of the HESS journal, which encourage such work, extremely well. The authors predict that similar studies will become much more frequent, as they will be highly needed to fully understand and adapt to global and climate change impacts in the future, not the least in coastal regions.

Re 6:

See comment (1 and 7) on the broad relevance for different scientific disciplines

Re 7:

Again we completely disagree, this is definitely not a report, but a holistic multi-disciplinary scientific study that includes and integrate scientific studies by three different research groups and even more research disciplines. As mentioned in the previous reply such studies are very much encouraged by the Aims and scope of the HESS journal.

Re 8:

We agree with the last statement that if our models are to be used in a climate change context, the models will be used outside the range for which they are calibrated, and

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that it will require a careful analysis of the consequences. However, isn't this true for all climate change models?

On behalf of all authors, Klaus Hinsby

Please also note the supplement to this comment:

<http://www.hydrol-earth-syst-sci-discuss.net/9/C2328/2012/hessd-9-C2328-2012-supplement.pdf>

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 2157, 2012.

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