

***Interactive comment on “Relations between topography, wetlands, vegetation cover and stream water chemistry in boreal headwater catchments in Sweden” by J.-O. Andersson and L. Nyberg***

**Anonymous Referee #1**

Received and published: 13 August 2008

General comments:

The paper describes a methodology and results of a study which combined topographic and vegetation information with stream water chemistry data in order to identify relations between topographic features, wetland characteristics and vegetation and stream water chemistry in boreal headwater basins in Sweden.

I think that the paper addresses a very important issue that need proper attention and I am convinced that the paper could be a useful contribution to this. Nevertheless, I

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have a variety of remarks that I would recommend the authors to consider. In its current form, I am not entirely convinced by the scientific value of the presented results and its interpretation, nor if the paper does provide a substantial contribution to scientific progress within the scope of HESS. Since results of the study are already published by the authors in "Hydrological Processes" as well as knowledge discussed by the authors such as scale related issues (chapter 1), the relation between water chemistry and wetland occurrence (e.g. chapter 1.2) or the importance of topography on wetland occurrence and distribution which is also widely discussed by the wetland and hydrological research community, I do not see substantial new concepts, ideas, methods or data of this particular paper. I also would recommend restructuring the paper. This should include shortening and restructuring of the introduction chapter which seems to me the major part of the paper (more than 2 out of 7 pages) as well as the results and discussion chapters. It would also be good to include a sound conclusion.

Summarizing the comments above and following, I would recommend publishing the paper only in the case of a substantial improvement regarding the description of methods, results and their discussion and relation to published papers in both the hydrological and wetland research community.

### Specific Comments (Selection):

1193-2: The term wetland should be defined in the paper or related to a classification system which in turns clarifies the definition of a wetland.

1193-14-17: This information on long-term dynamics of the Klarälven River is not cited, nor is the data set used in figure 1.

1195-5ff.: I guess there is a lot of basic understanding in this chapter which does not need necessarily mentioned.

1195-1: The title refers to vegetation cover which is not discussed in the chapter.

1196-2-4: When these studies already have shown the correlation between the occur-

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rence of wetlands and water chemistry in headwater catchments, the innovation of this paper should be better highlighted.

1196-24-25: Although the importance of the acidic bedrock is highlight above, this fact was excluded from the study because of a lack of information. The authors do not discuss this problem here or later and its affect on water chemistry at all.

1197-all: The overall study area was described roughly, but no information is given on the characteristics of the 18 catchments. An additional table might be helpfully in this regard.

1197-3-20: Does this average description give a characteristic for all studied catchments? What is the role of lakes in this area?

1197-23-25: It is not clear how this was done and what the output was.

1198-4ff.: In Chapter 2 it was indicated that forestry is the plays an important role in the study, but was not considered due its magnitude?

1198-10-19: The authors do not give any indication on the processing of the data to improve their quality, nor how they solved the problem of the inaccuracy of the contour lines due to vegetation thickness and surface roughness.

1198-18: What kind of vegetation data and how were the infrared photographs interpreted? Visually or digitally?

1199-1: Which are the vegetation types?

1199-3: Where is this information coming from?

1199-4: What built the basis for the classification of the mires? Was it given by the vegetation data, the infrared photographs (how was this done?), the vegetation map and/or the Swedish classification system? It would help to understand how this was done?

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1199-11: How is specific specified?

1199-15ff: It is not clear how these averages were calculated? Was it on the basis of 14 or 18 streams?

1200-all: All the results discussed refer to all 18 catchments. Are there any differences between the individual catchments?

1200-5: Why was L5 chosen when it has highest wetland coverage and lowest mean slope? Is it still representative for the 18 catchments?

1200-10ff: This is based on the calculation as highlighted by the authors.

1202-1ff: Since the PCA is a statistical method related to the variance of each included parameter, the PCA applied represents what you have to expect.

1202-17: It would be surprisingly; if there would not be a good correlation between mean TWI and wetland percentage area, since these are strongly linked. A bad correlation would indicate that either your wetland percentage information or the TWI (or DEM) is not reliable.

1202-all: No information is given on AI as it is referred to in the abstract.

1203-all: The discussion chapter tries only to explain a few of the results given. For example, only the DOC component is discussed in terms of water chemistry. What is about SI, Fe and AI? Most parts of the discussion refer to other studies like (Andersson & Nyberg 2008) or repeat existing knowledge given by studies related to the problematic of scales in relief analysis.

1203-27: The use of a 50m DEM and its effect on the variables was not specifically investigated, even though the problem of scale was discussed in the introduction chapter as well as in the discussion.

1203-7: The statement on the geologic conditions which might modify the topographic control of the wetness was brought up here for the first time. How does this study

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support the results by Rohde & Seibert 1999) or the given statement?

Some Technical Corrections:

1195-2: What are THESE attributes?

1195-24: Moore et al. 1993 were cited two times. Should be differentiated in a and b.

1198-3: This information needs to be cited, since the reader does not know about The Laskerud Project.

1200-17 double blank after data?

1201-10. double blank after twelve?

1201-16: Fig.7 is addressed before Fig. 6 (1201-20).

1202-23: double-blank after flow.

1205-7: m()odels

1205-19: I could not find this reference in the text.

1206-18: I could not find this reference in the text.

1209: table 1: It would be helpful to get information of the 18 catchments as well.

1211: Table 3: Does this distribution reflect each of the 18 catchments?

1212: Table 4: Does the occurrence of the vegetation type correlate with the size of each catchment?

1213: Table 5: Font size?

1216: Table 8: Although the correlations for Al, Fe and Si are given here, they are almost not discussed in the text.

1217: Figure 1: Source and unit (if necessary)

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Questions:

1. Does the paper address relevant scientific questions within the scope of HESS?

Yes, the paper addresses relevant scientific questions, but parts of it were already published.

2. Does the paper present novel concepts, ideas, tools, or data?

See above.

3. Are substantial conclusions reached?

See above.

4. Are the scientific methods and assumptions valid and clearly outlined?

See above.

5. Are the results sufficient to support the interpretations and conclusions?

Yes, but I would recommend a more meaningful discussion of the presented results.

6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)?

Yes, but more details on the selected catchments would be helpfully.

7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution?

The authors give credit to others work, but hardly discuss there own work in the context of the cited papers.

8. Does the title clearly reflect the contents of the paper?

See above.

9. Does the abstract provide a concise and complete summary?

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Basically yes, but it also addresses issues which are not meaningful discussed in the paper. For example, water chemistry and its relation to other variables is almost restricted to DOC. Further examples are indicated above.

10. Is the overall presentation well structured and clear?

The paper is structured and divided in different sections (Introduction, Study area etc.) which allow the reader to find certain information. Nevertheless, some chapters seem to require a certain revision by the authors to provide the reader with a "red line" while reading.

11. Is the language fluent and precise?

The language seemed to be fluent and correct, but might be improved by proof reading. (I am not a native speaker).

12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used?

Yes.

13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated?

Yes. See above.

14. Are the number and quality of references appropriate?

Principally Yes, but it might be helpfully to search the wetland related literature (for example the Wetland Journal) to provide more background information.

15. Is the amount and quality of supplementary material appropriate?

Yes, but some minor revisions are recommended regarding some tables. See above.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 1191, 2008.

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