

1 General comments

The paper 'Nitrogen surface water retention in the Baltic Sea drainage basin' addresses relevant scientific questions within the scope of HESS. The topic is relevant both scientifically and supporting river basin management and control of N loading to the Baltic Sea. The methods are not very novel themselves, but estimation of N surface water retention in the whole of Baltic sea basin is. My proposal is major revision of the manuscript, taking into account all comments.

My major concern is almost total lack of uncertainty discussion. The authors present one number, 380 000 t of N as annual retention, but not any uncertainty estimates/ranges with different parameterizations by the MESAW model.

Discussion is somewhat short – the authors only mention that high retention in lakes is in accordance with earlier studies – but do not give proper credit to many published N retention studies in parts of the Baltic Sea catchment area, and compare their results to only those of Mörth et al. (2007). It is also misleading that in Intro, the authors refer mostly to **in-stream** retention studies, but in Discussion they point out that **in-lake** retention is of high importance.

2 Specific comments

Title is good and abstract well written.

Section 2 Material and methods:

-the authors mention that retention is assumed to be the same for source categories P (point sources), dominated by inorganic load, and sources category S (total losses) which include varying shares of N, more in organic-N form. In these models, the assumptions are needed, but this assumption could be discussed in uncertainty discussion

Section 3 Results and discussion:

-To make it more clear, the authors should mention also the estimated total gross N load, 950 000 t N annually. Also here, comparison to earlier estimates would be reasonable to have.

-it is true that there is not apparent relationship between specific N load and share of wetland area, but from Fig 5b we can notice that load is always low in basins where wetland-% is >15%

-the term 'Other' is misleading, if these areas are practically all forests (are they?), the authors should include Fig 5d) of forests also into discussion

-the authors could also acknowledge PLC database by HELCOM which they use a lot, and to include reference /web-page. Which institutes provide data to that database?

-the authors present very detailed results of lake and in-stream retention in Table A2, but do not discuss of the average percentages of these. How is the share between these estimates and how reliable/uncertain they are? For example for Neva river basin, retention in total surface water is estimated as 0.74, but lake+In-stream retention (0.91) seems not to be in accordance with the total?

3 Technical corrections

-the last paragraph of Intro should be more concise and short, with no details on population and land use. Instead, there could be introducing paragraph in 2 Materials and methods, describing the area

-the estimates of annual N loads in Table A2 give an over-optimistic impression of the accuracy, e.g. Odra 70 289 195 kg N/yr !, I would propose to use tonnes N/yr