

***Interactive comment on* “Land cover effects on hydrologic services under a precipitation gradient” by Ane Zabaleta et al.**

Anonymous Referee #1

Received and published: 3 September 2018

General comments: The paper “Land cover effects on hydrologic services under a precipitation gradient” describes an exhaustive statistical analysis to evaluate the role of vegetation on the hydrology of a large region with a precipitation gradient in Northern Spain. The authors utilized a large amount of data to test the impacts of forest (native and exotic), as well as pastureland on hydrological variables. The manuscript reads well, is well organized, the objectives are clearly defined, the authors were supported by a good choice of bibliography in the field. It is an interesting paper, however, there are some aspects that require improvement before being considered for publication. In particular, the use of the term “hydrological services” that was not matured enough through the text, and the use of so many tables and appendixes. Specific comments and suggestions are included bellow. I believe they can be addressed with additional,

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descriptive text, and no additional analysis are needed.

Specific comments: Page 2, lines 15-20: The title expresses the concept of hydrological services, a term used to specifically relate the benefits people obtain from ecosystems related to water. These include, not only water quantity and regulation but also the dimension of quality. It is well recognized the role of forest on reducing diffuse water pollution. Since the manuscript only focus on the flows of water and their relations to land-use/cover, but never gets the human dimension of the hydrological services, why to use the term hydrological services and not simply water flows. My feeling is that the term “hydrological services” is not sufficiently polished in the Introduction section and throughout the manuscript to be used in the title. I suggest to revise the title accordingly, or to emphasize the concept of hydrological services, not only in the Introduction but throughout the text.

Page 4, line 1-2: Were the oak forests removed for plantations of *pinus radiata*? 39-48% of the area refers to total area or to forest area?

It is not clear in section 3.4, at what scale were the statistical analysis performed? I supposed for the entire 20 catchments, but then the aggregated value for the entire region masks geographical asymmetries.

The combinations used do not differ substantially from each other, why not to reduce for 3 combinations. Perhaps instead of number, the combinations should have a name, e.g. more exotic, more pasture, in order to better guide the reader in the further tables of results.

It was not clear where do these combinations applied? To the entire catchment. Why to call realistic. They seem to be scenarios of land cover? I recommend to clarify better these methodology for the readers understand results. Page 6: in which software were the statistical analysis carried out? Page 8, lines 7-10: This discussion is well organized and results are well-thought-out in perspective against work done by others. However, please consider that sometimes the growth of forest can have only a slight

effect, depending of course on other environmental factors, such as depth o soil, precipitation episodes, etc. Please consider to take a look on this publication: (Hawtree et al., 2015)

I would like to suggest a table with major findings of the study, a kind of summary to guide the reader. And also add a paragraph on this in the discussion. I think this table will summarize the work and can maybe substitute Table 5 and 6. Are forest fires a threat in this region? Are there any other possible factor that may influence discharge, e.g. forest management that is worthy to discuss? If yes for fire or other factors please add a paragraph in the discussion section around these topics.

Tables 4 to 6 – Did you dived results from catchments with high and low precipitation? Why not the same amount of precipitation in all analysis? Seeing Figures 2 and 3 I got the meaning of this precipitation division. I recommend this to be explained in the captions of the tables and in the methods section. In addition, please put what does each acronym in the table means, at least in the caption, otherwise it is difficult to follow.

I was missing a discussion around the practicability of these findings. Are they useful for policy makers? In which way?

Page 11, Lines 10 to 20: For me these sentences are more a part of discussion. You could create an extra section in the discussion section with major findings and policy implications. I would like to see a conclusion more summarized and without comparing the work with others.

Technical corrections: Page 2, line 18: Keestra et al., 2018, appears “Keesstra” in the References, which one is correct?

Figure 1: The figure is very informative. However, in figure 1 a) it was difficult to understand the border of the catchments, it is difficult to read what are the dashed lines for and the bold lines for. Maybe to delete the dashed lines since they are not

informative and highlight the border of the region and dashed lines the border of the catchments. Update legend accordingly. In the legend, please mention the spatial resolution and source of land cover maps. Table 1: Please detail where are land cover maps 2002 and 2009 coming from, spatial resolution, source. Table 2: I would like to suggest the meaning of the abbreviations described in the table, otherwise the reader has to look for these different meanings spread all over the text. The table as it is not informative. Please also put native and exotic 2 or 3 spaces right, because they are inside of forest section.

Page 5, line 11: where is Fig A1? Please cite Appendix A1.

Page 7, line 11: Fig. C1 is Appendix C? Please use the term Appendix, otherwise people will not understand. If figures in the Appendixes are so important for the study, why not to introduce them in the body of the text? Readers will need to have extra work downloading appendix to fully understand the paper. This is a suggestion, please consider if you feel that all the figures are important.

Please mention the periods of analysis, either in the captions (as Appendix A has), as well in the text (e.g. page 7 line 12 is missing the period of analysis).

Page 7, line 24. Please use “from” instead of “of”. Figure 2a shows results “from” the multiple regression

Page 8, line 23: where are the performance statistics shown? Page 8, line 26: in which way increases discharge? Values, Table?? Page 8, line 35: which land cover? Please refine the sentence.

Page 9, line 15: Please consider this article on these matters: (Carrick et al., 2018) Carrick, J., Bin Abdul Rahim, M.S.A., Adjei, C., Ashraa Kalee, H.H.H., Banks, S.J., Bolam, F.C., Campos Luna, I.M., Clark, B., Cowton, J., Domingos, I.F.N., Golicha, D.D., Gupta, G., Grainger, M., Hasanaliyeva, G., Hodgson, D.J., Lopez-Capel, E., Magistrali, A.J., Merrell, I.G., Oikeh, I., Othman, M.S., Ranathunga Mudiyanseelage, T.K.R.,

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Samuel, C.W.C., Sufar, E.K., Watson, P.A., Zakaria, N.N.A.B., Stewart, G., 2018. Is Planting Trees the Solution to Reducing Flood Risks? J. Flood Risk Manag. 1–10. <https://doi.org/10.1111/jfr3.12484> Page 11, line 23. Please remove “in” in the beginning of the sentence. Page 11, line 27: There simply is no unique “best combination. Please remove “simply”.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2018-366>, 2018.

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