

## **Comment on hess-2021-476**

Anonymous Referee #3

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Referee comment on "Influences of land use changes on the dynamics of water quantity and quality in the German lowland catchment of the Stör" by Chaogui Lei et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-476-RC3>, 2021

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The manuscript subject is important for providing information on land use change and corresponding impacts to water quantity and quality. The authors carry out a modelling study and 3 years of field work in the Stör catchment in Germany. However, as is often with catchment studies, detailed spatial measured observations are missing over a longer time period to make specific causal links between the type and time of land use change and the corresponding hydrological impact. The authors use a mix of model simulations, water samples, and statistics (e.g. PLSR) to draw such links. Several points need to be addressed before the manuscript can be published because as it reads now, the reader is not able to determine if appropriate statistical methods were used to draw the conclusions made.

### **Introduction**

The introduction can be tightened to highlight the scientific challenge and provide background information to frame the scientific question better. For example, especially the first part of the introduction until L 45 contains very general statements. The same applies to L 51-54, which can be re-written to be more to the point of the manuscript. See also L 72-73 that provides a very general statement, it would be more interesting to be more specific.

The key information in the introduction is provided on L 86-89, yet it is not described in sufficient detail. What have other scientific studies found on this topic of using PLSR for land use change and hydrology?

Overall, recent references are missing to show the state of the art.

## **Terminology**

Several key terms used throughout the manuscript are not adequately defined. The term "landscape metric" first appears on L 63 and used several times throughout the paper, also in key places in the results and discussion, but it is never defined. Please provide a description and examples of what is meant exactly by "landscape metric".

Similarly, the term "patch" is used and not defined (is this a similar land use area?). What exactly is meant by a patch? In Table 1, the metric landscape patch index (LPI) is described using the word patch, which is also not helpful if "patch" is not described beforehand.

Some terms are not consistently used, for example on L 307 "PPLAND" is used and on L 401 "PLANDp" is used. Is there a difference in these terms? Would be useful to briefly describe the nomenclature used.

## **PLSR**

Section 2.4 is a key part of the study, yet it is poorly described. From L 236-248 the methodology is not explained in sufficient detail, below are just some examples:

The change in landuse was from 3 periods, yet only 3 years (1987, 2010, and 2019) are provided. This is confusing and must be changed in the manuscript to specify that time intervals were examined. Re-write to define the time steps.

L 240-241 is difficult for the reader to follow: can an example be provided of the 50 random repetitions on 10 equal segments of the data set taken?

L 246-7 rephrase the sentence "By Wold's criterion..."

## **Other comments**

L 64-65 define the difference between a landscape metric and a composition metric.

L 205 provide a brief description of the methodology by Guse et al (2020) cited

L 413 rephrase the sentence "Clumped and connected ..."

If possible, a sketch would be helpful to visualize what is meant by the terms : LPI, AWISI, CONTIGAW, AI, IJI