

## Comment on hess-2021-306

Anonymous Referee #1

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Referee comment on "Quantifying the impacts of land cover change on hydrological responses in the Mahanadi river basin in India" by Shaini Naha et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-306-RC1>, 2021

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### Summary

This is my second review of the study by Naha et al in which the authors attempt to quantify the changes in the hydrological cycle due to changes in the land cover under future climate change scenarios. I am pleased to see that the authors have taken on-board all my suggestions/criticisms of the previous version. Overall, the manuscript has significantly improved and the results and analysis are appropriate for a regional study of land cover impacts on hydrology. I especially appreciate the inclusion of a comprehensive sensitivity analysis of the model parameters. I only have a few minor comments which are easily addressable.

### Comments

- It is interesting to see that soil related parameters are the most important parameters for runoff. A naive question: Are there any links between soil parameters and land cover change? I am not very well-versed in VIC but my question is whether changing landcover also impacts these soil-related parameters?
- In Line 110, the authors claim that daily time steps are used in the study. How reliable are daily values derived from climate change scenarios? It would be great if the authors can elaborate on the robustness and relevance of the daily simulations, especially in a climate change study.
- Line 50: Here the authors suggest that the croplands have increased by 82%. I think it would be helpful to have a baseline (82% increase compared to which year?)
- Line 225-230: The authors find that LAI values are in good agreement with a nearby Indian basin. It would be useful to mention the name of the basin here.
- Line 455: "...the model is able to estimate all the water budget components and maintain proper closure...". This statement is very misleading. Unless, I have missed the validation of the other water balance components, the authors do not yet have evidence to support this statement. Of course, in this study, this is not very important as relative changes are more important but several other studies have shown how calibrating with only streamflow adversely affects the accuracy of other water balance components. Moreover, hydrological and land surface models close the water and

energy balance by construct so the claim of proper closure is untrue.

- There are several grammatical and language-related idiosyncrasies which need to be corrected. I request the authors to rectify them (I only give a few examples here). Evapotranspiration need not be capitalized similar to the other water balance components. Also, Potential Evapotranspiration can be just potential evapotranspiration.

Line 110-115: "...impact studies is limited just with ..." should be "...impact studies are limited just to..."

Line 220: "...are not accounted for SA" should be "...are not accounted for in SA"

Line 480: "...enhances the accuracy for predicting hydrological responses..." could be "...enhances the accuracy of hydrological predictions..."

Line 485: "...are sensitive to this basin..." is not very accurate. Do you mean basin's runoff?