

Comment on hess-2021-400

Anonymous Referee #1

Referee comment on "Future upstream water consumption and its impact on downstream water availability in the transboundary Indus Basin" by Wouter J. Smolenaars et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-400-RC1>, 2021

The study by Smolenaars et al. titled "*Future upstream water consumption and its impact on downstream availability in the transboundary Indus basin*" used a water accounting analysis to investigate the role of upstream water consumption in downstream water availability in the Indus basin. This study cannot be defined as socio-hydrology research; however, their focus is still on a transboundary river. The authors claimed that their novelty is to reveal the effect of upstream water consumption in the Indus water availability under climate change and population growth. However, it is not clear if they have any other innovation in their approach compared to general research in transboundary rivers. Also, although the authors chose a transboundary river for their analysis, I am surprised how this research explicitly adds to each countries' understanding of their shared water resources in the future.

- Lines 1-2: downstream water availability?
- The introduction lacks literature on transboundary rivers in general. The authors should then explain if they have any novelties compared to the previous studies in terms of methodology. The focus of the current introduction is too much on the case study. Also, there is nothing about the approach used by this study and its comparison with approaches in previous studies.
- Lines 53-55: How do the authors can compare their work with studies by Amin et al. (2018) and Mehbood and Kim (2021) in terms of their approaches? What is the authors' argument for not taking a similar approach with these studies?
- After the introduction section, this study sharply goes to the method. A section needs to introduce the case study with a map of the basin, its hydrologic condition, water supply/demand sites, and other details. As this paper is about a transboundary river, I would suggest the authors also write about transboundary agreements currently/historically used in the basin and show countries' water rights.
- The current method section is convoluted. The method section needs to clearly show the approach of the study before explaining the scenarios.
- I would suggest authors use separate sections for data and scenarios.
- Lines 78-83: The purpose of these lines is not clear. The authors just explain some incomplete information about the work and just focus on the scenarios.
- Table 1 is not discussed in the manuscript.
- Line 121: what does "SPHY" stand for?

- I cannot find the Annex in general in the submission.
- Line 161: "blue water consumption" should be defined as it is mentioned for the first time in the manuscript.
- The result section should be organized in the way that each table/figure can be discussed in one subsection. It would read better than the current format.
- A general point in the result section: the authors always use numbers that are not clearly shown in the tables and figures. If the authors prefer to describe the numbers in terms of percentage, it is better to have a column in table 2 (as an example) that shows this information. Also, the authors should add another sub-plot if they want to talk about the total water consumption in figure 3. In the current format, readers have to calculate everything to understand the numbers.
- Line 222: suddenly jump to Table 2 before providing complete information for Figure 3B.
- The authors do not discuss figure 3A.
- Lines 233-234: "the relative growth ... the annual average", why does it happen? Is it only because of the agricultural sector?
- Lines 235-236: "Figure 3 shows ... both scenarios", is there any reason for it?
- Lines 238-239: "Table 2 ... 2060-2080 period" any physical interpretations?
- Lines 252-257: Please exactly define whether Figure 4A or 4B is read.
- Lines 266-269: only three lines for the description of figure 5?
- Line 368: "Indus Water Treaty", this is the first time it appears in the manuscript! Provide more information about the treaty in the case study section. The study is on a transboundary river; however, this is the first paragraph that discusses the results from a transboundary view!
- Line 377: some summary on the work, case study, and method should be provided here before writing about the findings.
- As a transboundary study, the study needs to provide understanding and insights for the water management of each country in the basin.
- The caption of Figure 4: "Top" and "bottom" needs to change to "A" and "B"
- The caption of Table 2: explain the "Mid" and "Late" in the caption