

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1  
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## **Comment on hess-2021-578**

Anonymous Referee #1

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Referee comment on "Socio-hydrological modeling of the tradeoff between flood control and hydropower provided by the Columbia River Treaty" by Ashish Shrestha et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-578-RC1>, 2022

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The manuscript titled "Socio-hydrological modeling of the tradeoff between flood control and hydropower provided by the Columbia River Treaty" by Shrestha et al. understand the cooperation dynamics in Columbia River Basin through investigating how and what factors drives the two countries into a successful cooperative regime in the past, and what would the balance shift in face of the social, institutional and environmental changes. The paper is generally well written and structured. The concept of the paper is interesting, and crucial one for understanding the underlying mechanism of a successful cooperation dynamic and transboundary co-evolutionary dynamics in general. On top of that, this study provides valuable insights and reference for the negotiations of the treaty within and beyond Columbia River. I recommend this paper being accepted with some minor revisions.

General Comments:

- The manuscript can generally be improved with a more solid literature review in the introduction. More specifically the authors are encouraged to review on the existing studies in understanding transboundary rivers management from different disciplines, and through the lens of conflict and cooperation dynamics. The selection of variables that influence on the choice of cooperation, i.e. institutional capacity, social and behavioral preferences could be articulated.

Detailed comments:

- Line 49: "actors' decisions are guided by their or social preferences", delete "or";

- In the introduction line 50-52, the authors stated that “actors exhibit social preferences if the actor not only cares about their own material benefit but also cares about the material benefits of other actors”, this is not clear, please re-structure this sentence.
- Line 64: update the number of global transboundary river basin with 310 rivers, see McCracken & Wolf 2019 for the most updated info on this:

“Updating the Register of International River Basins of the world” by McCracken & Wolf 2019, <https://doi.org/10.1080/07900627.2019.1572497>

- Line 70, what is “social comparison”?
- Paragraph 89 – 100 introduced the challenges of cooperation in transboundary river basins through listing the possible impacting factors, i.e. political/economic power, geographic locations, followed by the four types of benefits, which were a bit of a sudden jump, please consider re-structure this paragraph.
- Line 121- 135, descriptions on social preferences, there are four types of social preferences stated, what are the differences between the social preferences and social motives? There are also four types of social motives: individualism, competition, cooperation and altruism, how is the social preference differentiate with the social motives and why social preferences is selected here?
- Line 150, this research builds upon the work of Lu et al. (2021), could the author explicitly explain the novelty developed for the model used in this paper, what are the advancement?
- Figure 2, some variables illustrated in the figure are not explained, i.e. “utility for cooperation”, “Utility for no cooperation”, etc., also, the feedback loop illustrated could be improved by differentiating variables by different types, i.e. economic variable, hydrological variables, social variables, etc., to reflect the infrastructural, hydrological, economic, social, and environmental aspects being considered in this model.