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Comment on hess-2021-521

Anonymous Referee #4

Referee comment on "A system dynamic model to quantify the impacts of water resources allocation on water-energy-food-society (WEFS) nexus" by Yujie Zeng et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-521-RC4>, 2021

This study modeled the WEF nexus by incorporating community sensitivity and reservoirs operation, where the co-evolution behaviors of the nexus across the water, energy, food, and society (WEFS) were simulated by the system dynamic model. The proposed approach was applied to the mid-lower reaches of the Hanjiang river basin in China, and the results indicated that water resources allocation could ensure water supply through reservoirs operation and greatly decrease the water shortage rate. This study is an interesting and crucial one for improving resources management. While modeling the WEF nexus in a large watershed is a very challenging problem and difficult to validate its suitability and applicability, especially when there are only limited datasets. This study made a great effort in this direction and proposed a sophisticated methodology with some preliminary analyzed results, which is a valuable contribution to the scientific community. However, I have some concerns and suggestions, which need to be better addressed, listed as follows.

- The initial conditions of external variables for the integrated system shown in Table 2 and the calibrated parameters presented in Table 3 should be explained in more details. I am curious why many parameters have the same calibrated value. How to set these values?
- How many datasets are used for model calibration? The number of calibrated parameters used for model calibration should be discussed. How to justify the suitability and applicability of the calibrated model should be given.
- The "Respond links" among the different variables in the WEFS nexus should be explained in much more detail. The terms of feedback functions based on previous work should further explain their suitability.
- Figure 4 shows the trajectories of population, GDP, crop area, water demand, energy consumption, food production, shortage rates for water, energy, and food, awareness for water shortage, energy shortage, and food shortage as well as environmental awareness during 2010-2070. The trajectories are the basis of the following analyses. How to get these trajectories should be given in more detail, and their suitability should

be discussed?

- How to divide the evolution of water demand and energy consumption into four phases should be given?
- The seven controllable parameters adopted for sensitivity analysis should be discussed in more detail.
- The conclusion seems like a long summary of the current study. The main contribution with brief (solid) scientific findings extracted from this study might be more interesting to read and easy to learn.