

A big improvement compared with previous version but still need to be improved before it can be considered for publication

Anonymous Referee #2

Referee comment on "Identifying the dynamic evolution and feedback process of water resources nexus system considering socioeconomic development, ecological protection, and food security: A practical tool for sustainable water use" by Yaogeng Tan et al.,
Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-68-RC2>, 2021

The research topic is greatly related to the academic frontier of hydrology & water resources and the significant requirements of socio-economy and ecological protection, which has theoretical and practical implications. I have reviewed the previous version of this paper (hess-2020-461) and glad to see the changes based on my previous comment. The first reviewer also pointed out some concerns about this paper and gave the details about the paper (see the marked supplements), and I quite agree with them. I believe they are helpful for the authors to fully revise the paper. In my view, before the paper can be published, the authors should consider not only the concerns and remarks from the first reviewer but also the following three points:

First, in section 2.1, the authors should add one or two sentences to explain the connections (or relationships) between external drivers (as authors stated as "pendulum model") and core methods (SD and optimal model). In other words, what are the mechanism and methodological bases of nexus changes driven by external changes? Please explain it in the revised paper, or it will be confusing.

Second, as the authors stated in L88-90, "those methods are used to simulate the dynamic status and feedbacks just in an objective way but no optimal function inherently, which limits the goal of sustainable water uses to some extent". But in the following sections, I didn't see any qualitative or quantitative analysis and proofs about the advantages of the methods used in this paper compared with the current methods. Does it improve the model's reliability, or, achieve the coordination more accurately among different agents under external changes? Or either of the two models cannot achieve the desired effect? Or other better effects? Such analysis should be implemented in the Discussion section to better enhance the contribution of the paper and better answer the research question.

Third, some comparisons should be made between other studies. For example, I saw the relative research from Tan et al., (2019) which deals with a similar area using similar optimal approaches but, some results and conclusions are not consistent. For example, in that paper, the authors state that the socio-economic agent is more sensitive. But in this paper, they claim that river ecological agent is more likely to influence the model's robustness. Why do the different results happen? Please explain it. By the way, I didn't read the entire paper (Tan et al., 2019, Water, 11, 4) in-depth and just see its conclusion section. But I believe every reader will have this question if only read the conclusion part of both papers. They may not read the entire paper but the abstract and conclusion.

For the third point, I'm not meaning the results of either of the paper is wrong, I mean the necessary discussion compared with other researches should be made for deeper discussion to improve the paper's quality. The original intention of each research paper itself is to explore the unknown field of a certain subject or topic, instead of justifying if the results are absolutely right or wrong. Various assumptions and different methodologies are encouraged in any research activities.

If those concerns are fully considered in the revised paper, I believe that it will be a good research paper and will be ready for publication.