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Reply on RC3

Yaogeng Tan et al.

Author 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-AC4, 2021

Thank you for your positive remarks on our paper. We will thoroughly revise the paper based on your comments. Below please find out the responses to your comments:

1. The naming scheme of the "SEF" nexus, which also noted socioeconomy, ecology, and food, has no core basis. After all, our subject (or academic discipline) is hydrology & water resources. I do know water resources is one of the key support of these three items but, from the perspective of "nexus" naming, water should be included in the nexus terminology (or jargon), that is, water-socioeconomy-ecology-food nexus (WSEF nexus). Or it will be confusing.

A decent point. We will make changes in the revised paper.

2. Section 2.4 (start with L399): evaluation index system seems to be widely used in other studies and not specific. I don't know the difference when the same evaluation system is used in other studies because it's also suitable in other studies. So, how can the indicator evaluation system represent the sustainable development of a nexus system? (I don't know if my understanding is right, just my personal view.)

Thank you for this question. The core content is to evaluate the sustainable water uses of the nexus system. So there should be a quantitive evaluation of how sustainable water use is like. Only qualitative estimation cannot reveal the coordinative degree (or how the best/good/worst status could be defined), so the evaluation system that evaluates the sustainable water uses of a system were adopted in this study. This is just a tool to evaluate how sustainable status is like.

3. The paper lacks the calibration and validation part. Conceptual models should be calibrated and validated before using and simulating in a real case study. Please add such analysis (even the result).

Yes. Model calibration and validation can not be omitted. We will add this part.

4. The nexus system used in this paper is a case study of the humid region of south China but lacks universality analysis, that is, is the model only suitable for the humid region or all-region? Are dry regions also suitable?

A good question. This study is exactly a case study of Southern China in order to verify the reliability and availability of the nexus framework. About the availability of other regions, we will try to do it in our future research. This is the main limitation of this study and we acknowledge it.

5. Results: Section 4.2.3: socioeconomy-food response linkage. It seems that carrying population/GDP is in direct proportion to crop yield from this paper. But in real cases, the relationship between crop production and carrying population is not as simple as a linear relation. Their relations are really complex and cannot simply be analyzed from a quantified trend. See Lyu et al., 2020.

Thank you for this point. This paper mainly focuses on the dynamic interaction and feedback linkages of the water resources system. But in most cases, crop production is roughly in proportion to population sizes, because crop production supports people's survival. The socioeconomy-food linkage is presented based on this assumption. However, if this point is deeply explored, crop production and population size (or GDP) are not as simple as a linear relationship, which can be another good research field and is beyond the scope of this paper. This point can also be the main limitation of this paper.

6. L32: agricultural water uses have nothing to do with rainfall, it should be a "process of agricultural water demand". As authors rightly said in Section 2.2.3, food production is greatly related to Wp (Crop water demand, see Eq.9), which is substantially related to ET0, instead of rainfall.

We will make changes.

7. L43: Add "However," before "the dynamic interactions....." to connect the logic. These two sentences have an adversative relation.

We will make changes to the revised paper.