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Hydrology and Earth System Sciences
Discussions

Interactive comment on "The socio-ecohydrology of rainwater harvesting in India: understanding water storage and release dynamics at tank and catchment scales" *by* K. J. Van Meter et al.

Anonymous Referee #3

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I. Summary of the review

This work attempts to increase our understanding of rainwater harvesting tank systems used in regions where biophysical and sociological factors are relevant. In particular authors focus on the water-exchange dynamics of these systems both at tank and catchment scales. The work is of interest and suitable for this journal as it deals with a relevant topic, and clearly has the potential to contribute to the science of socio-hydrology. Nonetheless some issues need to be addressed prior to acceptance for publication. In particular I have certain concerns with some methodological aspects, which are described below.

II. Major comments:

1. The application of the White method: I think there are two issues here that need to be better clarify, as the method is central to the research and the results. In particular, Eqs. 1 and 2 seem to imply that sluice flow takes place only during the day. Is that the case? Is it a valid hypothesis? Could the term -S_o be in equation 1 instead of equation 2? The manuscript mentions that at certain points ET seems to reach very high values. I am wondering if this is partially due to how S_o was considered in Eq2. Moreover a value of S_y = 1 was adopted, whereas section 4.3 is mentioned to be a section where "important caveats regarding this assumption" are presented. There is no section 4.3, and I do not see a strong analysis elsewhere in the document addressing the assumed value. Indeed the specific yield concept applied to these equations is not totally clear to me, and I think it could be better presented in the text.

2. The approach to analyse the no-tank scenario: Authors mentioned the "Strange method" to simulate this scenario, which I think it is not well known for the community. Furthermore, the reference provided (Shanmugham and Kanagavalli, 2013) seems to be a local publication in India. Nothing is said about the method despite its application is critical, as important results and conclusions are based on the simulations of the system with no tanks using the model. How does it work? Is there any bold assumption? How should the reader approach the results based on potential limitations of the model. I think a better explanation of the model is critical. Moreover, the classification of the landscape with three domains seems to be a very specific decision that could be better supported, both through a clearer rationale and a sensitivity analysis (for example, recharge for domains 2 and 3 are very specific. Particularly for the domain 3, a very specific value of 17% of rainfall is used).

3. In section 4.2.3 it is not clear whether the "wasted" water from the different tanks is indeed wasted. Sluice flow from one tank could enter the next ones and be used for irrigation. The analysis seems to be only local in this regard, although the authors have point out the relevance of a systemic approach. Please clarify.

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4. In my opinion, the manuscript is a little bit wordy. When describing my minor comments, I try to identify some paragraphs whose size can be reduced, although throughout the document there are opportunities for reducing the number of words. In particular I think the conclusion section is to long as it dedicates many lines to present a kind of abstract of the work.

5. The literature used in the manuscript: This is a paper that focuses on a local case study in India, and thus, a significant portion of the references seem to be local reports and publications. Scientific literature is not used to the extent of typical manuscripts in a scientific journal. I fully understand that this situation is explained by the topic of research, but I think the editor may want to make sure that the journal is OK with this.

III. Other comments:

1. In the title, I would suggest changing "at tank and catchment" and simply use "across"

2. I was not familiar with the term "command area". Maybe it is a good idea to clarify the concept the first time is presented (i.e., ...)

3. Some descriptions in the first paragraph of section 3 are very detailed. I am not sure whether this is needed.

4. I suggest removing "found to be" in line 11, page 12130.

5. I would suggest using a letter different than “h” in eq.1 and eq. 2 because it is easy to get confused and read 24 hours.

6. I do not understand what the authors are proposing in lines 7-9, page 12132. Moreover, the end of this paragraph could be reduced with the support of figure 1.

7. Because of the results described in line 24-25, page 12134, in Fig. 5 I would suggest to color differently the ET fluxes when inundated areas are larger than 25% of the maximum area. Moreover, How are the +/- values estimated or computed? What

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is the precise meaning of them?

8. Line 9 and 10 in page 12135 define again S_y. Is it needed?

9. In general, captions of figures are unnecessarily long. One thing that authors should do is to better use legends to explain the meaning of the different series in the plot. Currently they use the caption to do so.

10. Rewrite sentence in lines 9-10, page 12137 in a simpler manner.

11. Line 20-22, page 12137. Why using “most” if only one reference is provided?

12. Some tables could be simplified. Maybe the magnitudes and corresponding percentages could be presented in a single row using the value and then the percentage in parentheses.

13. At the end of page 12138 authors mentioned that “These relatively small percentages contradict the established view of tanks losing a significant fraction of their water through ET”. I think the sentence is more accurate if the ET vs recharge comparison is explicitly mentioned. In other words, I think the current sentence can be read as if ET in the study area is small. Indeed what happens is that the ratio of ET vs recharge is small, and thus recharge itself can be really high in the study area.

14. Figure 11 is cited several times, although is not included in the manuscript.

15. Line 3, page 12142. It should be Brouwer et al. (1989)

16. Table 1: What is the meaning of column %total? Is it needed? Table 2: Meaning of current tank capacity? What area the implications and meaning of soil types?

17: Could you locate the weather station in figure 1a?

18: remove “a” in “view of a tank 4” (caption of figure 4)

19. I think equations are not needed in figure 3

20: Figure 4: Because of the temporal scale, the initial conditions for the tanks are not

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clear. Maybe you can talk about it. Additionally, Why water levels in tanks 1 and 2 are plotted only until January?

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 12121, 2015.