Interactive comment on “Hydrological impact of rainwater harvesting in the Modder river basin of central South Africa” by W. A. Welderufael et al.

Anonymous Referee #1
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The authors present and discuss the results of an interesting study concerning the potential impacts of infield rainwater harvesting on various hydrological fluxes in a catchment in South Africa. The subject is highly relevant for the future of smallholder agriculture in Sub-Saharan Africa, and presents some major scientific challenges. The scientific significance of this paper for HESS is hence, in my view, high. However, quite a bit of work remains before the article can be considered of publishable quality. Below I highlight my major remarks. These are then expanded on and supplemented by more detailed remarks in the attached file.

* It is not clear in the text how this study is different from previous work (Mwenge Kahinda et al. 2009 etc.). Please clarify how this study adds to the present understanding of IRWH potential in the area.

* Ensure to present the most important statistical results in the abstract so that the reader directly understands the main point of the article.

* Please ensure to justify various claims with proper statistical justification (see attachment).

* If I understand right the calibration period is only 1 year, and there is no validation period. As explained in the attachment, the authors need to justify this, and an independent validation period is needed.

* Please provide a clearer and more detailed definition and justification of scenario setups.

* Parameter non-uniqueness is a commonly observed issue when calibrating SWAT (see e.g. Andersson et al. 2009 in HESS, www.hydrol-earth-syst-sci.net/13/2329/2009/). Can you elaborate on the possible effect of alternative equally likely parameterizations on the scenario results?

* The methods section needs to be revised considerably. The structure is poor and a lot of information on the actual procedure is missing. I suggest a structure along the lines of: 2.1. Study site: details about the area, 2.2. Input data: which datasets were used (DEM, soil, landuse, climate (precipitation, maximum/minimum temperature?) incl. references), if/how were they modified (e.g. were the climate records complete or did you do some infilling?), 2.3. Model & setup: basic model function, model version, reference to detailed description of the model, how sub-basin delineation was done, how PAST, Agri-CON and Agri-IRWH were parameterized (enough detail so that a person familiar with SWAT can reproduce it) etc., 2.4. Sensitivity, calibration & validation: method(s), objective functions, period of calibration & validation, gauging stations used. 2.5. Scenario definition/description: detailed description of how the different scenarios were simulated (How much was CN changed? Which tillage functions were used?), if they...
were simulated the same way everywhere and in all seasons, and a justification for the approach (Why is CN+[tillage function X] a good way to simulate IRWH?), 2.6. Statistical analysis: What methods were used to judge if scenario outcomes were significantly different? Justify the choice.

Finally, I agree with the comments raised by the editor-in-chief Prof. Savenije regarding appropriate use of units and referencing key papers in the field. I advice the authors to follow his recommendation. In addition I would like to highlight a few more references, which are highly relevant to this paper:


Please also note the supplement to this comment:

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 5051, 2011.