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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.

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The paper quantifies the water balance of a nested system of small reservoirs (aka tanks) in southern India. The authors used pressure transducers to measure water level in four tanks over a wet season, field measurements of tank capacity and sluice outflow, and a simple method (White) to estimate recharge and ET. The study is the only one I know of that systematically measures the water balance of a cascade of tanks, and adds very useful information to understanding of such systems. The authors are to be commended for making a comprehensive set of field measurements and analyzing me in a useful way. The paper is very well written and easy to read. I have

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mostly minor comments, with some more substantive questions about interpretations of "waste" flows and management implications.

Specific comments: see attached PDF for additional details and suggestions. I think there may be some errors in table 2, the ratio of irrigated area to water surface area. See comment in the PDF.

A little more information (one sentence) on the Strange method would be helpful. Is it a regression equation? Water balance similar to Thornthwaite?

L566 refers to "surplus sluice outflows". Next lines say that they will be lost to evaporation or runoff. But runoff is already low (5% of precipitation) and the surplus could also recharge groundwater through channel infiltration or infiltration in irrigated fields, which would not be "wasted". Flow out of the watershed could be important for downstream users, as suggested in other parts of the text. I would argue that excess sluice outflows are only "wasted" if they end up in pools and evaporate, or perhaps if they are evaporated by riparian systems downstream of the tanks and don't contribute to "beneficial ET", sensu Molden. We don't really know what happens to those extra sluice flows, and they may be beneficial or not.

The authors should refer to other work on watershed-scale water balances of tanks and smaller water harvesting structures in southern India, including:

Batchelor, C. H., Rama Mohan Rao, M. S., & Manohar Rao, S. (2003). Watershed development: A solution to water shortages in semi-arid India or part of the problem? Land Use and Water Resources Research, 3, 1–10.

Bouma, J. A., Biggs, T. W., & Bouwer, L. M. (2011). The downstream externalities of harvesting rainwater in semi-arid watersheds: An Indian case study. Agricultural Water Management, 98(7), 1162–1170.

Calder, I., Gosain, A., Rao, M. S. R. M., Batchelor, C., Snehalatha, M., & Bishop, E. (2008). Watershed development in India. 1. Biophysical and societal impacts.

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Environment, Development and Sustainability, 10(4), 537–557.

Calder, I., Gosain, A., Rao, M. S. R. M., Batchelor, C., Garratt, J., & Bishop, E. (2008). Watershed development in India. 2. New approaches for managing externalities and meeting sustainability requirements. Environment, Development and Sustainability, 10(4), 427–440.

Garg, K. K., Karlberg, L., Barron, J., Wani, S. P., & Rockstrom, J. (2012). Assessing impacts of agricultural water interventions in the Kothapally watershed, Southern India. Hydrological Processes, 26(3), 387–404. http://doi.org/10.1002/hyp.8138

Garg, K. K., Wani, S. P., Barron, J., Karlberg, L., & Rockstrom, J. (2012). Up-scaling potential impacts on water flows from agricultural water interventions: opportunities and trade-offs in the Osman Sagar catchment, Musi sub-basin, India. Hydrological Processes, n/a–n/a. http://doi.org/10.1002/hyp.9516

Please also note the supplement to this comment:
http://www.hydrol-earth-syst-sci-discuss.net/12/C6131/2016/hessd-12-C6131-2016-supplement.pdf

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