

## ***Interactive comment on “HESS Opinions: The Myth of Groundwater Sustainability in Asia” by Franklin W. Schwartz et al.***

**Graham Fogg (Referee)**

gefogg@ucdavis.edu

Received and published: 27 September 2019

This Opinion paper is a well-written, sobering description of the ongoing crisis of groundwater mis-management in Asia and prospects for changing course. Despite its negative bottomline message that the crisis likely cannot be averted, I enjoyed reading the paper and believe the readership will find it interesting and thought provoking.

All of my edits and comments are marked directly in the PDF that is uploaded with this review.

My main comment is that the message – that it’s highly unlikely for groundwater in Asia to ever be managed sustainably – is too negative. Granted, this is an opinion piece, and the authors are entitled to their opinion, but I think they might be missing an opportunity

C1

to provide more impetus for positive change. I worry that the negative message may do more to stifle groundwater management than to produce beneficial change, and all under the assumption that such change is impossible. For added perspective, consider the following:

- Any of the needed groundwater information infrastructure would be cheap relative to the spending these countries are currently doing for construction and maintenance of surface water infrastructure (dams and conveyance). So if they realize they must have something, they can likely find the means to achieve it. One less dam project could free up enough funds for a national groundwater monitoring network. Thailand’s Department of Groundwater (yes, there is such a thing) has been doing this nationally since the 1950-60s and hence has been more proactively managing groundwater.

- The world may be entering a period of change with respect to groundwater management, although it may require considerable coaxing and crises to get there. Since widespread deployment of industrial scale groundwater pumping technologies some 70 yrs ago, very little effort has been devoted to recharging and managing groundwater. In essence, civilization has not yet begun to try to manage groundwater very much, mainly because it has not had to, mainly because of the vastness of most groundwater basin resources. But now that may be starting to change. See the discussion piece: <https://trend.pewtrusts.org/en/archive/spring-2019/groundwater-the-resource-we-cant-see-but-increasingly-rely-upon> . I agree – it is questionable whether such change can happen soon enough in Asia, and people should also start preparing for the worst.

- One could argue that a big part of the problem is the lack of transparency of groundwater systems, making the state of gw resources easier to ignore. There are technologies coming along that could change this significantly – e.g., low-cost wireless, real-time groundwater level monitoring networks connected to open-source web platforms to track fluctuations in groundwater levels (these may require cellular networks, which are already more extensive in parts of rural Asian than parts of rural America); and future

C2

versions of GRACE that work on spatial scales of 50 km rather than 400 km (National Academies of Sciences, Engineering, and Medicine 2018. Thriving on Our Changing Planet: A Decadal Strategy for Earth Observation from Space. Washington, DC: The National Academies Press. <https://doi.org/10.17226/24938>.) If a new generation of GRACE comes along that actually works on relevant water resources management scales (~50km), that could be revolutionary for groundwater management. The satellite deployment agencies across the globe need to be reminded of this constantly to help make it happen.

I still recommend the paper be published with minor changes, but just suggest you reconsider the tone and bottomline message in light of the above.

Best Wishes, Graham Fogg

Please also note the supplement to this comment:

<https://www.hydrol-earth-syst-sci-discuss.net/hess-2019-399/hess-2019-399-RC3-supplement.pdf>

---

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2019-399>, 2019.