Hydrol. Earth Syst. Sci. Discuss., 10, C5307–C5310, 2013
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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Review article: Quantifying the human impact on water resources: a critical review of the water footprint concept" *by* J. Chenoweth et al.

Anonymous Referee #2

Received and published: 1 October 2013

This paper provides a useful overview of the WF, but also of other approaches, such as LCA etc. In this regard, it is valuable as summary which brings these together, but is a bit long-winded, discursive and then ends weakly. Some key aspects of other critiques are missed or ignored, although those papers are referenced (see below). As a result, the paper is a useful general discussion document, but does not live up to its title i.e. .."a critical review..". This is highlighted by a very weak conclusions section. It is well placed in HESS-D, but I am not convinced that it should progress to HESS in its current form. Unfortunately, the limited responses to the paper do highlight the shortcomings of HESS-D as a useful discussion forum.

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Examples of aspects of other reviews that seem to be missed:

- Although the Witmer and Cleij paper is cited, a key message from that review, which the authors seem to have missed, is that “these water volumes hardly reflect environmental impact; the water footprint indicator is unsuitable to be used for goal-setting, policy-making, monitoring and evaluation, in relation to sustainability”. In their conclusions, it’s not really clear what the authors are recommending regarding the usefulness of the WF in sustainability assessments.

Another key criticism that has been raised by various others and not adequately dealt with:

- Wichelns (2010a) argued that "any useful information provided by the water footprint is already available through existing water resources management tools and that the usefulness here is in the package and high profile of the WF. Methodologically, there are some major shortcomings in the full water footprint assessment. Xref to Pg 9409 and discussion in Line 20 onwards.

Suggestions for Improvement: I suggest that key points from each paper are tabulated to provide a better overview of the critiques of WF and LCA. There have also been several critiques in HESS-D reviews, and these “interactive comments” could provide additional information for the review. See for example, the papers and reviewers comments and discussion around:

- Fader, M., Gerten, D., Thammer, M., Heinke, J., Lotze-Campen, H., Lucht, W., and Cramer, W.: Internal and external green-blue agricultural water footprints of nations, and related water and land savings through trade, Hydrol. Earth Syst. Sci. Discuss., 8, 483-527, doi:10.5194/hessd-8-483-2011, 2011.

- Bulsink, F., Hoekstra, A. Y., and Booij, M. J.: The water footprint of Indonesian provinces related to the consumption of crop products, Hydrol. Earth Syst. Sci. Discuss., 6, 5115-5137, doi:10.5194/hessd-6-5115-2009, 2009.

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- Mekonnen, M. M. and Hoekstra, A. Y.: The water footprint of electricity from hydropower, Hydrol. Earth Syst. Sci. Discuss., 8, 8355-8372, doi:10.5194/hessd-8-8355-2011, 2011.

and others

The conclusions section is weak – basically just re-opens the arguments, and doesn't effectively bring out the key points from the main body of the text. Thus, the review does not really provide a way forward as per the heading "Present options and future directions" apart from a suggestion (which doesn't really stand out clearly enough) that corporate water footprinting is best dealt with by incorporating water use into LCA (Pg 9418: Line 18).

What about the point on Pg 9410 Line 7 that "As the methodology and results of water footprint analysis becomes more spatially and temporally speciïňĄc and thus sophisticated, it loses its major strength – an indicator that simpliïňĄes complicated data down to a form which is conceptually simple and readily understood". Surely this should be better used in the discussion of the future of the WF?

To some extent, this reveals a lack of knowledge (and a missing aspect of this paper which has only passing reference to "dynamic" models and poor analysis of what are termed "bottom up methods"), of existing water resources management and planning approaches and tools (as per the Wichelns critiques). This is typified by a vague implication that the "gold standard" for quantifying water use impacts could "hopefully" be met through the WF and rather vague and emotively written final two sentences of the paper.

Thus, they don't really address two hard questions, which from the preceding text and other critiques are:

1 - Do we need to develop the WF concept further or is the limit of its usefulness reached when it starts to intrude onto the role of these well-established water resources

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planning and management tools which are based on decades of research and practice.

2 - Alternatively, should policies for the future sustainable management water resources have a stronger global than local context i.e. a better exploration of the Hoekstra (2011) position.

Other points:

Pg 9399: Line 14 – with reference to footnote 4. The authors quote Launianen 2013 and the case of Fennoscandian forests. However, there is a large body of literature that highlights this concern from a water resources perspective, in particular in semi-arid and developing countries, and show completely different results from those of the temperate regions. See for example:

- Jewitt, GPW and Kunz, RP The impact of biofuel feedstock production on water resources: a developing country perspective. Biofuels, Bioproducts and Biorefining (2011) 5, 387-398

- Janine M. Albaugh, Peter J. Dye, and John S. King, “Eucalyptus and Water Use in South Africa,” International Journal of Forestry Research, vol. 2013, Article ID 852540, 11 pages, 2013. doi:10.1155/2013/852540

Pg 9417:”From an academic perspective” – what does this mean?

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 9389, 2013.