

***Interactive comment on “Assessing water footprint at river basin level: a case study for the Heihe River Basin in northwest China” by Z. Zeng et al.***

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Responses to the comments from Referee #1:

Thank you for your constructive comments on our manuscript. We have addressed your comments one by one below and revised our paper based on your suggestions.

Comments

First, the aim of the paper is not clearly clarified. The authors mentioned that few studies have focused themselves at the river basin scale. However, there are still some

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studies at the river basin scale, e.g. Zhao et al. (2010) calculate the water footprint in the Haihe River Basin, China. The authors should add some relevant references to the paper.

Responses

Thank you for the constructive comment. We have clarified the aim of our article in the revised version [Page 3, line 17-18]. The studies recommended by the reviewer have been added to our paper. In addition, we also provided reasons for the few studied at a river basin level as follows:

“WF assessment studies at river basin level are rare in literature largely due to the lack of statistical data at the river basin level. Among the very few studies, input-output models have been tested to estimate WF at the river basin level, such as for the Haihe river basin (Zhao et al., 2010) and for the Yellow river basin (Feng et al., 2012). It is still necessary to test whether a bottom-up approach (Hoekstra et al., 2011) promoted by the Water Footprint Network can be successfully used for WF assessments for specific river basins, particularly for those in arid and semi-arid regions” [Page 3, Line 9-16]

Comments

Moreover, researching at the river basin scale is not enough to indicate the importance of the study. The authors should also indicate the importance of researching the water footprint at the river basin scale and why the relevant study is scarce.

Responses

Good point. Assessing WF at a river basin level is an important step to understand how human activities influence natural water cycles, and it is a basis for integrated water resources management and sustainable water uses. WF assessment studies at river basin level are rare in literature largely due to the lack of statistical data at the river basin level. Among the very few studies, input-output models have been tested to estimate WF at the river basin level, such as for the Haihe river basin (Zhao et al., 2010)

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and for the Yellow river basin (Feng et al., 2012). It is still necessary to test whether a bottom-up approach (Hoekstra et al., 2011) promoted by the Water Footprint Network can be successfully used for WF assessments for specific river basins, particularly for those in arid and semi-arid regions.

We have added the above statements in the revised article. [Page3, Line7-16]

Comments

Second, I suggest that the authors should compare the results of the virtual water content and water footprint with other studies using the same method.

Responses

Thanks for your suggestions. We have taken the advice and compared our results with other studies with the same methods. [Page11, Line 6-29]

We compared the virtual water content (VWC) of crops and livestock with follow studies:

Chapagain, A. K., and Hoekstra, A. Y.: Water footprints of nations, Value of Water Research Report Series No. 16, UNESCO-IHE, Delft, the Netherlands, 2004. Available at: <http://www.waterfootprint.org/Reports/Report16Vol1.pdf>. last access date: 29/3/2012.

Liu, J., Zehnder, A. J. B., and Yang, H.: Historical trends in China's virtual water trade, *Water International*, 32, 78-90, 2007.

Liu, J., and Savenije, H. H. G.: Food consumption patterns and their effect on water requirement in China, *Hydrology and Earth System Sciences*, 12, 887-898, 2008.

Zhang, D.: Virtual water trade in China with a case study for the Heihe river basin, Master thesis, UNESCO-IHE, Delft, the Netherlands, 2003.

Comments

"Water footprint" appears many times after you use the acronym WF.

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Responses

Thanks. We have revised the manuscript and used acronym WF after its first appearance.

Comments

Page 5780 line 25 should read "800 million people lacking of a safe supply of freshwater".

Responses

Revised.

Comments

Page 5781 line 4 replace "of" with "for".

Responses

Revised.

Comments

Page 5783 line 5 you should explain why you don't include the grey water in your study.

Responses

Good point. The main reason for not including grey water is due to the lack of data on pollutant discharge. We have mentioned this in the paper [Page 4, Line 14-16]. We also believe ignoring grey water will lead to underestimation of water footprint. We have discussed this issue in the later session. [Page 14, Line 27-29]

Comments

Page 5790 line 3 delete "according to our estimate".

Responses

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Revised.

#### Comments

Page 5792 line 3-5 “Moreover, WF includes consumption of green water, in addition to blue water, while the traditional statistics on water withdrawal only account for blue water. In contrast, WF can quantify what type and how much water is consumed by human activities.” The sentences use a long-winded way of expressing that water footprint includes both blue and green water component.

#### Responses

Thanks for your suggestion. We have changed the sentence into the following one:

“Moreover, WF can quantify how much and what type (blue or green) of water is consumed by human, while the traditional statistics on water withdrawal only account for blue water.” [Page 13, Line 7-9]

Please also note the supplement to this comment:

<http://www.hydrol-earth-syst-sci-discuss.net/9/C3237/2012/hessd-9-C3237-2012-supplement.pdf>

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