Hydrol. Earth Syst. Sci. Discuss.,
doi:10.5194/hess-2017-63-RC5, 2017

Hydrology and Earth System Sciences
Discussions

Interactive comment on "Marginal cost curves for water footprint reduction in irrigated agriculture: guiding a cost-effective reduction of crop water consumption to a benchmark or permit level" *by* Abebe D. Chukalla et al.

Anonymous Referee #4

Received and published: 29 March 2017

The paper tries to derive marginal costs curves for water footrpint reductions. In summary, the paper calculates costs and savings of standard practices using the standard tool Aquacrop for 3 european locations plus Israel. The concept is straightforward and therefore of limited originality. The author claim to be the first doing this type of analysis, while later in the paper they admit it has been done previously in the same context but slightly different condition. The difference is relation to water footprint, which is in this context very specifically defined (and only late in the paper). The definition deviates from international standards and should be introduced early in the paper (acknowledge the different definitions and provide rationale for the chosen approach). Additionally, the

scope is very narrow (selecting 4 locations) but not having actual case study data and thus being theoretically. However, the topic as such is not novel and might be suitable for an irrigation journal.

All regions are high income countries and therefore this needs to be stressed in the title (add in high income regions). Also cost data is partially only representative of EU conditions.

One major flaw in the analysis is the lack of accounting of important costs such as fertilizer and land, which is completely omitted but highly important, since land is typically limited and therefore deficit irrigation has a yield reduction (which is a land cost increase). The results are therefore to be reconsidered.

L 14 The authors write about water footprint permit per hectare, which needs to have a rationale

Introduction in general: The authors mainly cite their own work, while it is important to give a broader overview, especially in a diverse field such as water footprint, where many different water footprint concepts have been published and the reader needs to be informed what is done here and how this relates to other work.

L100: here it is important to talk about land use costs too

Section 2.2 is basically directly summarizing Aquacrop and might be moved to Appendix as it does not provide important additional information (at least it can be summarized).

L188ff: The authors talk about green water and differentiating it form blue water. However, there is no way this can be properly done nor is there any hydrological definition of green waster vs. blue water. However, if the concept is used, literature refers to green water as soil moisture (see Falkenmark et al) and thus this is in conflict with previous research. I suggest to omit as it does not add meaningfull information.

L204-206: What about fertilizer use? Is this assumed to be optimal? What are the cost

related to it?

L208. The authors define water footprint cutting supply chain (which is comonly icluded even by the author's own references on water footprint). E.g. seedling and fertilizer water use should at least be mentioned.

Section 2.4. Since major aspects (land and fertilizer costs) are omitted the analysis is very theroetical and not covering the full picture. Additionally the author mix data form global sources and European, while it is used for the European context. Adjustments to price levels needs to be discussed. Some data is really old (1992)

L260. Where is the StDev presented?

L293: the scope of the study (locations etx) should be presented at the beginning, since up to this point the reader supposes it is a globally relevant study.

Results: the results must be revised after inclusion of the additional costs. Also they should report uncertainties. this also applies to the discussion. Especially the main finding that deficit irrigation is useful (even win-win based on this study) the authors should also discuss why there is still potential for it and why it has not been done already (what are the constraints etc).

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., doi:10.5194/hess-2017-63, 2017.