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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Global scenarios of irrigation water use for bioenergy production: a systematic review" *by* Fabian Stenzel et al.

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We thank Mr. Ellison for his helpful comments and suggestions. We believe that most of these suggestions can be tackled straightforwardly by adding more background information and reflection on the different approaches taken by the studies reviewed, which we aim to do in an enhanced Discussion. We agree and will point out that for further research, it would be great to have more information from the studies (in particular gridded data on water demands, plantation size) or even results from a model-intercomparison project, with which a whole different analysis could be provided.

More detailed responses:

1) An analysis of atmospheric moisture and river runoff from bioenergy irrigation seems

impossible, especially given the limited information we have from the studies. We however will reflect on this and look into your literature suggestions. It also strengthens our argument, calling for more detailed and accessible data and results for future review studies.

2) Are you talking about forest residues as side-products from timber production and thus managed forests or more general about forest litter and residues? In our literature corpus we could only identify the usage of forest residues or similar as biomass feedstock in the studies Beringer et al., 2011 and Stenzel et al., 2019. Beringer et al. include "residues from agriculture and forestry, municipal solid waste and animal manures" on the order of $\sim$100 EJ/yr, while Stenzel et al. include the initial timber harvest from the land use conversion of forests, and Fajardy et al. wheat straw residues as biomass feedstock.

3) We will add more information on this.

4) We will sort out possibly confusing terminology. Generally we refer to green or blue water as water available to the plants defined by the source, either direct rainfall (ending up as soil moisture and/or evapotranspiration), or freshwater withdrawn for irrigation from rivers, reservoirs or groundwater. We follow the definition used e.g. in Fader et al., 2011 – which we will make more explicit.

5) The considered studies implement biomass plantations on very different areas with various prior usage. We will add more information how much total land is "available" in these different categories.

6) Generally the studies we analyze disentangle crop irrigation and bioenergy irrigation (however usually only report the latter) and we only introduce crop water irrigation demand when looking at other water uses.

References: Fader, M.; Gerten, D.; Thammer, M.; Heinke, J.; Lotze-Campen, H.; Lucht, W. & Cramer, W. Internal and external green-blue agricultural water footprints of na-

tions, and related water and land savings through trade, Hydrology and Earth System Sciences, 2011, 15, 1641-1660

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