

Interactive comment on “A framework for modelling the complexities of food and water security under globalisation” by Brian J. Dermody et al.

Anonymous Referee #1

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This is an interesting and timely paper, proposing a new method/framework to capture cross-scale and cross-sector, globalized food-water interactions as apparent, for example, in virtual water trade. It is great to see such a forward-looking paper that promotes novel ways of modelling (building on combinations of existing approaches). However, the text is rather long and it is difficult to comprehend what the core and the novel aspects of the new framework are about. Thus I recommend rewriting some sections, i.e. coming up with a better and more concise paper structure that much earlier introduces the main aspects of the framework, also introducing cities and their hinterlands as a focus/example. Below are some comments on where and how such a better focus could be arranged.

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Abstract: “The approach unifies and extends the existing fields of hydrology, Integrated Assessment Modelling and agent-based modelling.” This may be an overstatement. . . maybe not unifying but combining, integrating certain aspects of, or something like this. I think the present concept is not yet as mature.

Why have this first paragraph of the Introduction (which is more on water stress than the questions addressed here).

p 3 l 15: really unifies existing model approaches? see comment above

p 5 l 17: twice “it challenging”

p 8 l 34: “envisage a collection of basin-scale sociohydrology’s”, what do you mean?

Section 2 reads like a review of literature (2.1, cities in global context; 2.2, feedbacks of projections in general; 2.3 food and trade; 2.4 water use pathways – all three sub-sections only loosely connected by the way). It would be good if the overall idea of your (new) concept was summarized earlier and more systematically, so that readers know the particular context of this section. Also, in section 2.1, cities appear rather suddenly as a topic, please introduce this focus earlier.

Similarly section 3: lot of literature review (also including process descriptions that would better fit section 2) while one rather assumes that this section better guides the reader how and for what purpose earlier modelling/accounting approaches (i.e. footprint/virtual water trade studies and sociohydrological studies, ABM-based studies) could be unified. I recommend that these two sections be shortened, more focused, as they are quite verbose.

Section 4 also lacks some introductory remark on how all the aspects (or which of them) mentioned before find their way in a unified model framework. The claimed purpose that it will “capture the structure and constraints of the food system and the dynamics that operate within these constraints and bring about emergent water use patterns” is rather general and probably too ambitious (really capturing all the structure

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and constraints of the food system? this would include many more aspects than those mentioned, including e.g. access). The basic structure of the framework needs to be clarified much earlier, otherwise it is difficult to follow what it actually covers, and how it does so. Section 4.2 starts with introducing yet other model types (water & food models), so this should rather go to section 3. Then follow again some process descriptions (cities linked to hinterlands) which should rather go to section 2?

And: is any of this new model and analysis framework already in operation, or is it 'just' a concept not yet tested?

p 7 | 26-27: is that really substantiated, "much of the mid-latitudes will become much less agriculturally productive"?

p 10 | 35: Basel, hinterland crossing three nations: I am not surprised by this and would expect that it actually extends across many more countries (because as you say earlier, industrialized countries import most of their products – from many countries around the world)?

p 11 | 12: "Thomas Brinkhoff": there are more such cases where citation is not correct (only surname to be used).

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