Hydrol. Earth Syst. Sci. Discuss., 12, C1251–C1253, 2015
www.hydrol-earth-syst-sci-discuss.net/12/C1251/2015/

Hydrology and Earth System Sciences
Open Access
Discussions

Interactive comment on "Moving sociohydrology forward: a synthesis across studies" *by* T. J. Troy et al.

Anonymous Referee #1

Received and published: 24 April 2015

Summary: This paper synthesizes a collection of studies, mostly from the special issue in HESS/ESD, "Predictions under change: water, earth, and biota in the Anthropocene," and brings out certain key elements that in the opinion of the authors dominate these studies, such as one vs two directional coupling, type of socio-hydrological data used, norms and ethics as feedbacks, value laden nature of socio-hydrological research, etc.

Comments: This paper is an interesting contribution to the special issue. The discussion of one-way vs two way feedbacks and dynamic connectivity is quite interesting. I have only few concerns which I hope would help the authors to provide a more balanced synthesis.

1) The statement in their abstract that socio-hydrology can be embedded in socio-

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

ecological studies has nowhere been substantiated by the synthesis.

2) The paper perhaps may want to provide an exhaustive review of the special issue first before embarking on the synthesis. This will allow potential readers to put the synthesis in context of cited literature. At present it appears that the synthesis is selective and often the paper gives an impression of being an opinion piece rather than an unbiased synthesis of the special issue. References to the articles from the special issue appear to be selective.

3) Do we need a synthesis of the special issue to discuss the challenges faced by socio-hydrological research methodologies? Models will always be value laden, or that finding appropriate data will always be a challenge irrespective of the field of research.

4) Section 3.1 and 3.2: if socio-hydrology is limited by data, to what extend can we then use techniques from nonlinear dynamics theory (including identification of dynamic connectivity, threshold behavior, and multiple stable states) or from econometric literature on causal inference? These techniques do not work well when data is scarce. Further, do the suggestions of the authors that we should use complex system science and econometric techniques in socio-hydrology emerge from the synthesis of the special issue?

5) Use of econometric methods in reducing bias in estimation of sociohydrological model parameters is an opinion that I share with the authors. But the assumptions behind existence of estimation bias in econometric models are based in microeconomic concepts such as utility maximization. Techniques such as instrument variable regression have been proposed to remove such biases, assuming that agents, for e.g., maximize their utilities. Yet the authors suggest the use of econometric methods for causal inference alongside the use of nonlinear system dynamics theory that does not have any microeconomic underpinning. The synthesis of the authors suggests that system dynamics based socio-hydrological models are the only types of models in the special issue. I wonder if one can then use econometric methods for causal inference

HESSD

12, C1251–C1253, 2015

using such models.

To elaborate further, consider the flood-human model of Di Baldessarre et al. (2013). The movement of population center to or away from a river corridor and human actions of raising a levee are given by apriori specified functions. Corresponding parameters of the functions are accordingly defined. While such specifications provide powerful insights, the nature of bias in estimating its parameters is not clear unless there are certain underlying models that specify how the choices of population movement and raising of levees are made. Without a clarity on underlying choice hypotheses, it is difficult to apply instrument variable techniques such as 2-stage regression to remove parameter estimation bias. Efforts are currently underway to explain coupled human flood systems using growth theory, expanding the possibility to understand and remedy biases in inferences of causal relationships. The authors may therefore want to further clarify when to use econometric methods for parameter estimation of socio-hydrological models.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 3319, 2015.