

Interactive comment on “Socio-hydrology and the science-policy interface: a case study of the Saskatchewan River Basin” by P. Gober and H. S. Wheeler

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Received and published: 22 November 2013

We thank the reviewers for their thoughtful and relevant comments on our paper. Although their perspectives, emphases, and specific comments varied, there was one common theme—the need to define socio-hydrology and to link it more effectively to the Saskatchewan River Basin case study. Socio-hydrology is an emerging field of study, and it is quite natural that there would be different views of its definition among the people who aspire to occupy this intellectual space. For Sivapalan et al. (2012), it is the science of water and people focused on the predicting water cycle dynamics, interactions and feedbacks between human and natural coupled systems. For hydrolo-

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gists, this conceptualization is a way to add human activities and decisions to the study of water and focus on human-natural coupled systems and their emergent properties. For social scientists, it is a mechanism to question the assumptions, definitions, and indeed the worldviews of traditional water science and its link to integrated water resources management. We acknowledge Sivapalan et al.'s (2012) definition but add the study of governance mechanisms appropriate for uncertainty, complexity, and emergent systems and knowledge systems for translating science into action. This view is now articulated in the abstract, stated in the introduction, used to inform the case study, and explicated more fully in the conclusions.

Feldman picked up on the importance of social processes surrounding the transfer to water knowledge under conditions of uncertainty. If socio-hydrology is to avoid what Feldman and Ingram (2009) call the "loading dock" model of knowledge transfer where scientists deliver models, forecasts, and predictions to decision makers, then practitioners of the new field of socio-hydrology will need to rethink the inherently social process of knowledge transfer. There is a large and growing literature that shows that this process is more iterative, enduring, collaborative, and transparent than what has traditionally characterized the relationship between water science and policy. Feldman and Ingram (2009) point to the vital role that boundary-spanning organizations have played in building capacity for knowledge transfer and social learning among scientists and decision makers.

The van der Zagg review challenged us for an in-depth re-analysis of the policy process in the Saskatchewan River Basin over the past 10 or 20 years. While we agree that this interpretive, in-depth, place-based policy work should be central to socio-hydrology, it was outside the scope of what we hoped to accomplish in this paper—synthetic case study to illustrate socio-hydrology's central themes of water system dynamics, linkages between human activities and natural processes, emergent behaviors, the need for new governance strategies to deal with uncertainty, and the use of science for decision making and policy formulation. We added Molle's (2009) observation that

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river basin management is a socially constructed process, and embraced Huitema and Meijerink's (2010) assertion that new governance mechanisms are need to manage water systems approaching critical tipping points and transitioning to new states. Also in response to this reviewer we have: 1. Rewritten the introduction to provide a working definition of socio-hydrology, talk about its use as a frame for the case study of the Saskatchewan River Basin. 2. Changed the text to acknowledge the co-evolution of human and natural processes. Problems of water security in the Saskatchewan River Basin are longstanding and primarily the result of urbanization, land use change, poor governance, and resource exploitation. Climate change will occur in a Basin that is already vulnerability from human processes. We agree with the reviewer on this point, although we aspire to balance priorities of the paper between environmental and human/social processes. 3. Rectified the problems with acronyms.

The third reviewer (Penny) correctly notes that this is a synthesis paper and advises a clearer statement of objectives in the abstract and introduction, and clearer articulation of socio-hydrology in the conclusions. We have rewritten the introduction to frame this case study in the larger discussion of socio-hydrology and have rewritten the conclusions to do as the reviewer suggests: connect the socio-environmental challenges of the Saskatchewan River Basin to the approach of socio-hydrology. We have also re-drafted the figures to simplify them and ensure their readability when printed in black and white.

In sum, we acknowledge the criticism that the paper did not actively engage the ideas of socio-hydrology in describing water problems in the Saskatchewan River Basin, and we have repositioned it to highlight the goals of this new field. We have stated how we conceptualize the work of socio-hydrology and how this perspective is represented in our synthesis of the Basin's major challenges. We make every effort to include references suggested by the reviewers, editorial suggestions, and amendments in the graphic materials. At the end of the day, however, a synthesis paper, by definition, lacks the detailed, in-depth analysis of a traditional research paper. It emphasizes

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the links between policy and process, between the human and the physical, and between science and decision making and shows how these links are manifest in Western Canada. There should be a place in socio-hydrology for place-based synthetic pieces that ground the field in real-world science and practice.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 6669, 2013.

HESD

10, C6430–C6433, 2013

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